

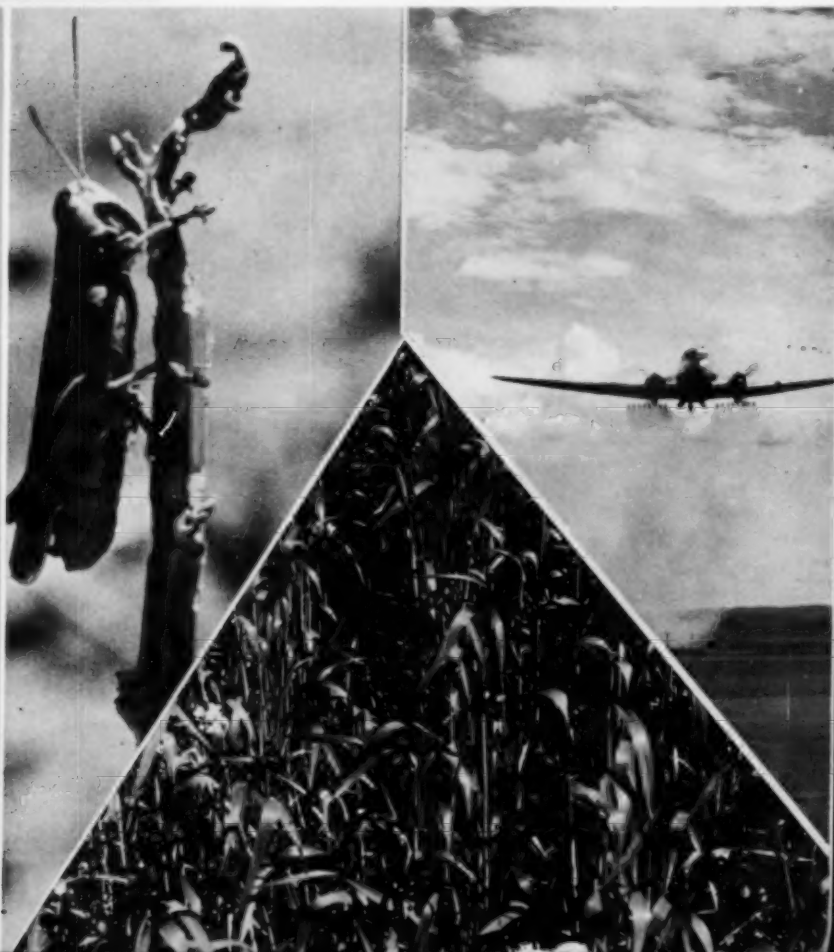
AGRICULTURAL

Chemicals

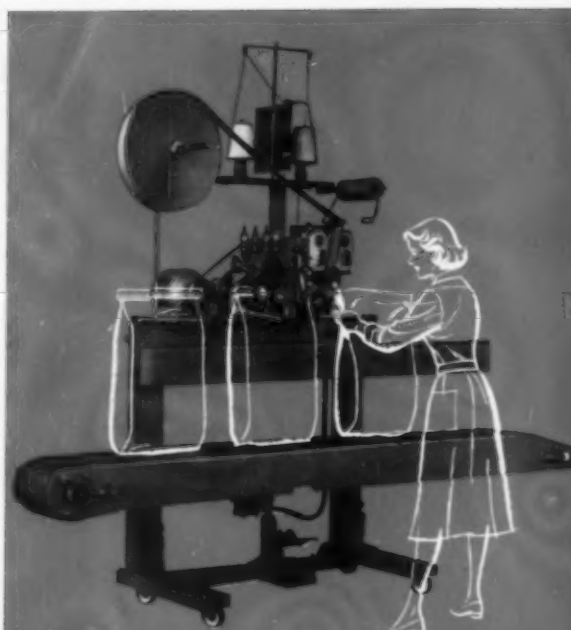
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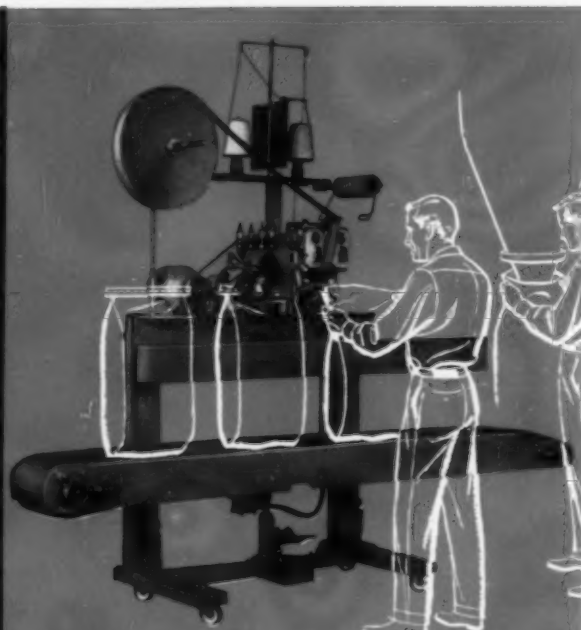
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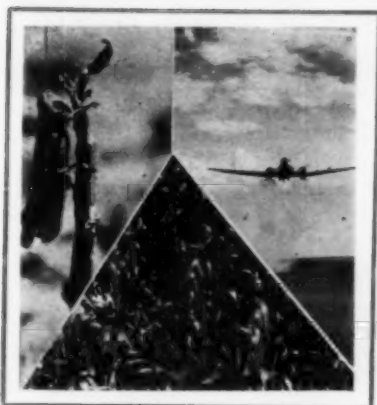
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AGRICULTURAL CHEMICALS



This Month's Cover

More than a million acres will be treated by aircraft in the government program just announced to combat the serious grasshopper outbreak in five western states. See story, page 75.

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Vol. 13, No. 7

July, 1958

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Chemicals

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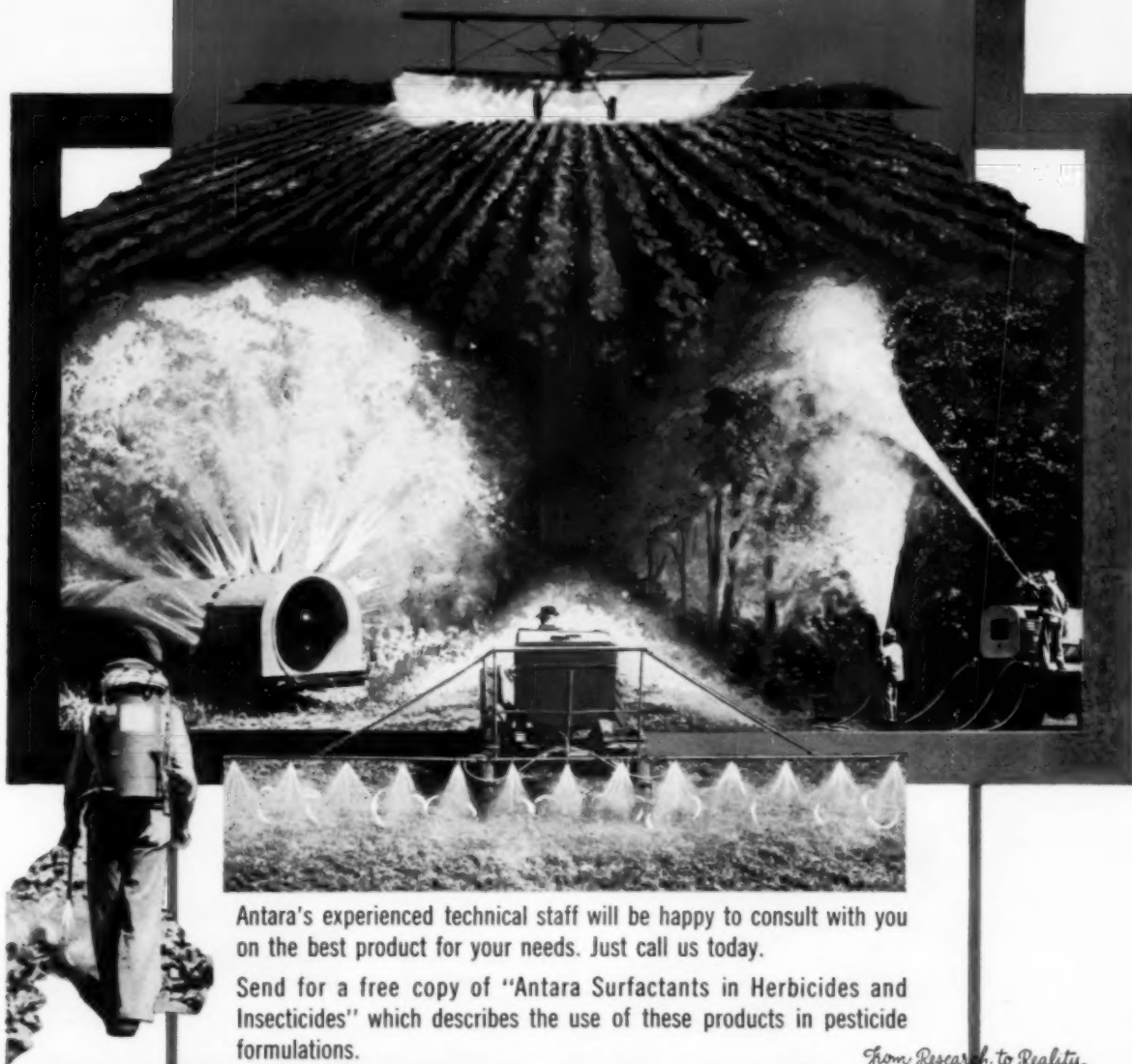
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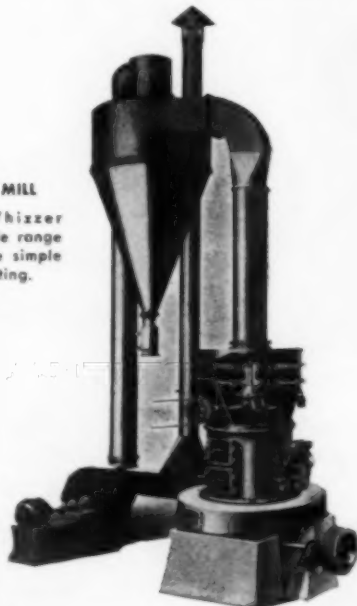
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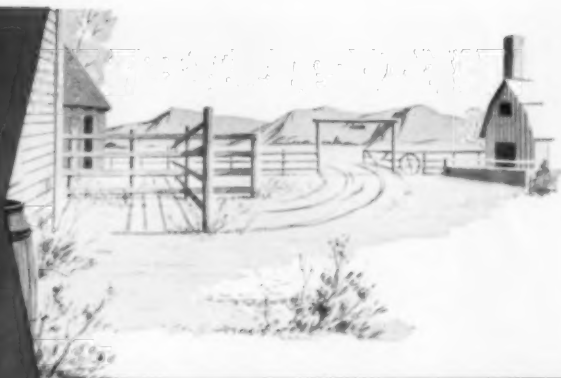
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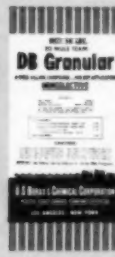
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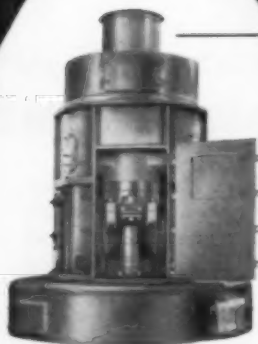
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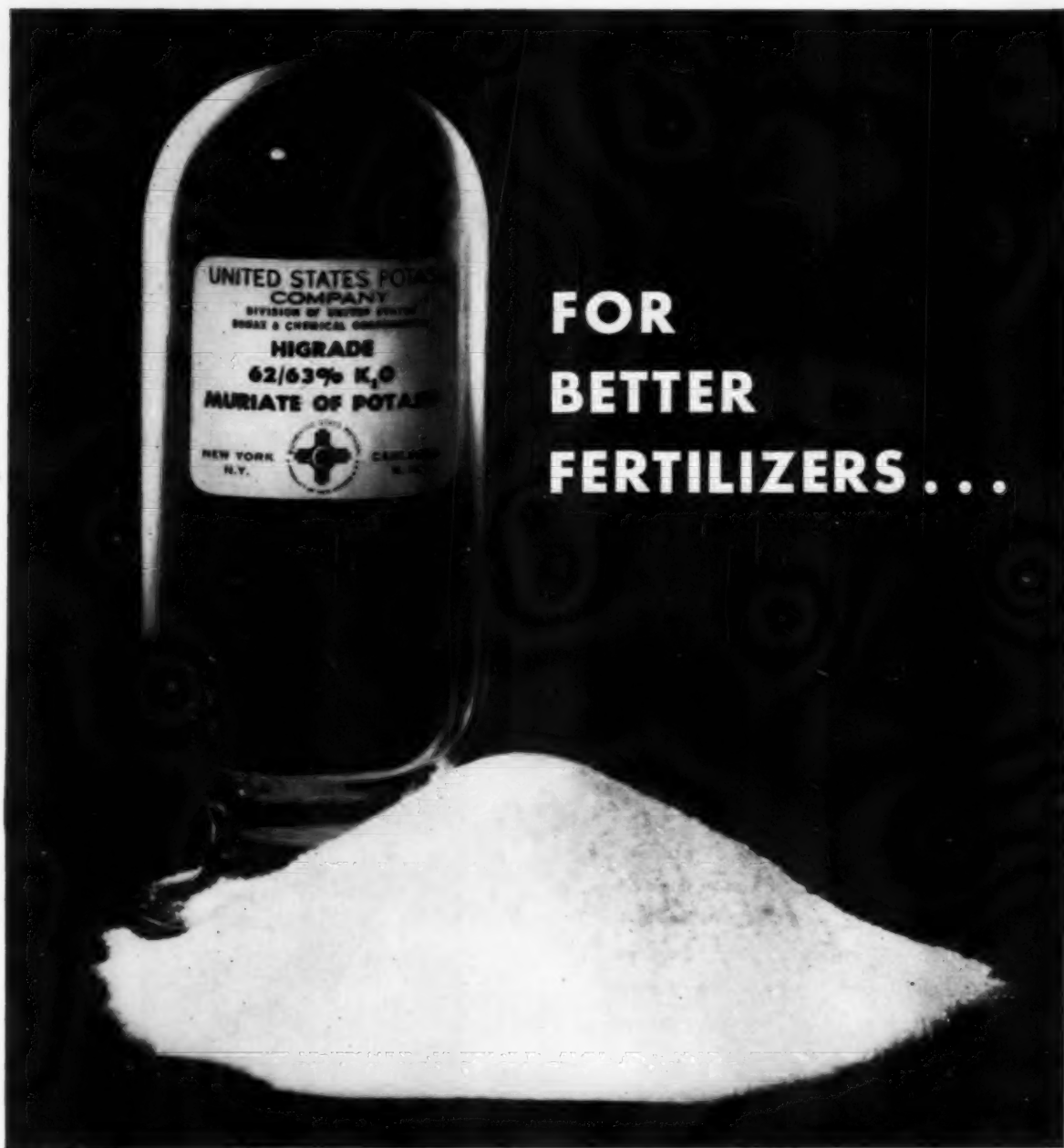


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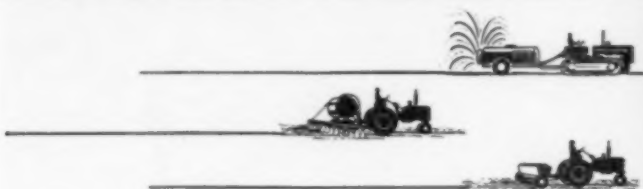
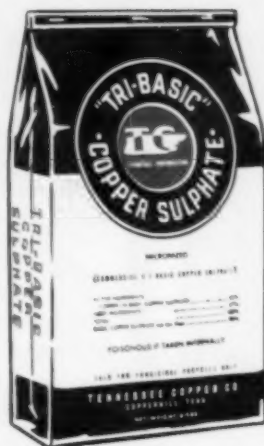


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Industry Meeting Calendar

- July 8-10—Pacific Northwest Plant Food Association, Regional Fertilizer Conf., Pocatello, Idaho.
- July 13-16—Northeast Branch of the American Society of Agronomy, Cornell University, Ithaca, N. Y.
- July 18-19 — Southwest Fertilizer Conference and Grade Hearing, Buccaneer Hotel, Galveston, Tex.
- July 30 — Kentucky Fertilizer Conference, Greenville, Ky.
- Aug. 4—Annual Meeting, National Joint Committee of Fertilizer Application held in conjunction with American Society of Agronomy, Purdue University, Lafayette, Ind.
- Aug. 10-14—29th Annual Meeting, Rocky Mountain Conference of Entomologists, Cameron Pass 4-H Club Camp, Gould, Colorado.
- Aug. 12-13—Summer Field Tour of the Pesticide Institute, Ohio Agricultural Experiment Station, Wooster, Ohio.
- Oct. 14-15 — Western Agricultural Chemicals Association Annual Meeting, Villa Hotel, San Mateo, Calif.
- Oct. 22-24—Pacific Northwest Plant Food Assn., Gearhart, Oregon.
- Oct. 28-29—Northwest Garden Supply Trade Show sponsored by the Oregon Feed and Seed Dealers Assn., Portland, Oregon.
- Oct. 29-31 — Fertilizer Industry Round Table, Park Sheraton Hotel, Washington, D. C.
- Oct. 29-31 — National Agricultural Chemicals Association Bon Air Hotel, Augusta, Ga.
- Oct. 29-31 — Eighth annual meeting of the Entomological Society of Canada and the 95th annual meeting of the Entomological Society of Ontario, Guelph, Ontario.
- Nov. 9-10—California Fertilizer Assn. 35th Annual Convention, Ambassador Hotel, Los Angeles.
- Nov. 24-25—Eastern Branch, Entomological Society of America, Lord Baltimore Hotel, Baltimore.
- Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.
- Dec. 3-4—North Central Weed Control Conference, Netherland Hilton Hotel, Cincinnati.
- Dec. 9-11—Chemical Specialties Manufacturers Assn., Sixth Annual Meeting, Commodore Hotel, New York.
- Dec. 17-18 — Beltwide Cotton Production Conf., Rice Hotel, Houston, Texas.
- Dec. 26-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.



*In the
Spotlight
this Month*

- **Biological Chemical Control** . . . Fixed spray schedules, selective materials, accurate sampling methods are factors in developing a program of pest control utilizing both chemical and biological methods. Page 30.
- **Blasting Fertilizer** . . . Description of safe and efficient use of explosive in the blasting of fertilizer which has caked in bin storage. Page 33.
- **Potash Sizes** . . . Conclusion of a two-part discussion of the optimum mesh size of potash for granulation and blending with other coarse materials in fertilizer manufacture. Page 34.
- **Pest Control in India** . . . BHC and DDT are major insecticides used in controlling pests of sugarcane and cotton in Indian agriculture. Page 37.
- **Fertilizer Demonstrations** . . . Demonstration plots, group meetings, county agent programs, mass media and field days make up a program directed to Oklahoma farmers, stressing the benefits to be obtained from fertilizer. Page 57.
- **Illinois Custom Applicator School** . . . Illinois spray operators keep up with new developments in agricultural chemicals, equipment, and other topics of concern to a custom applicator at an annual "school" on the University of Illinois campus. Page 45.
- **Aerial Fertilizer Application** . . . A custom built spreader designed to apply up to 300 pounds per acre over a 27-foot swath width is the basis of aerial fertilizer application by a Kansas applicator. His plane carries a 750 pound load. Page 47.

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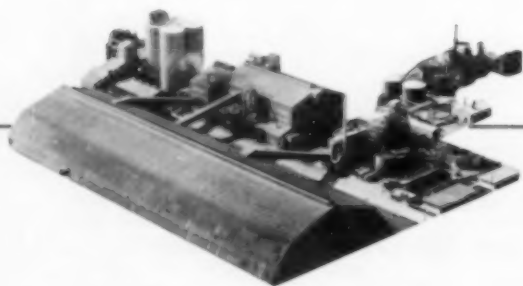


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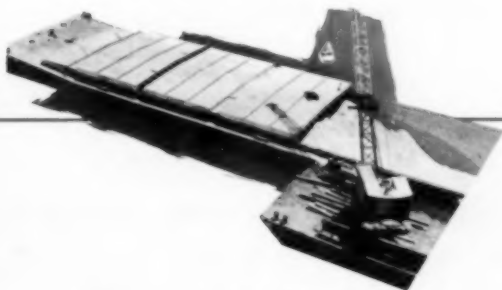
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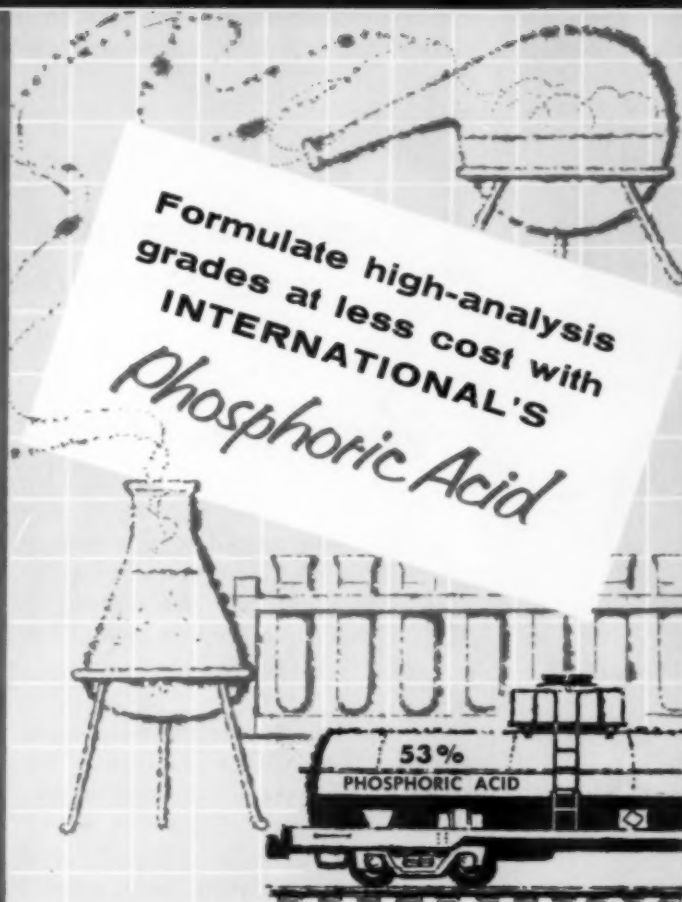
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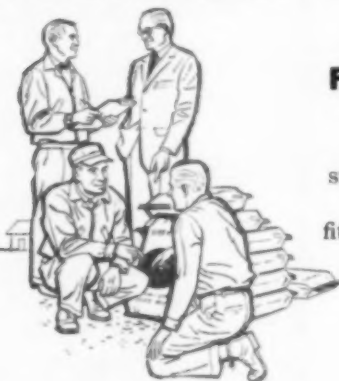
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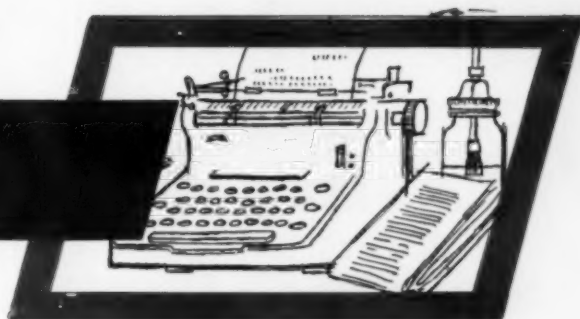
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CYANAMID

EDITORIALS



RETURN of a "Buyer's Market" over the past year or so has revived interest in the almost forgotten art of "selling." Right up in the front line in this revival has been the National Plant Food Institute which is currently getting ready to plow a considerable sum into a mammoth unified advertising and sales program designed to expand the overall market for fertilizer. Proceeding on the theory that "no one company has the funds to put on an advertising and sales promotion campaign of the magnitude that is needed," to quote W. R. McGuirk, Jr., president of Davison Chemical Co., a speaker at last month's NPFI convention, it is proposed to mount "an intensive joint education, advertising and sales promotion program" to keep the industry's sales on the upward trend that we have grown accustomed to accept as normal over the past fifteen or so years.

This, to our way of thinking, is a much sounder and more forward-looking program for counteracting the current lag in fertilizer sales than the expedient of simply cutting prices. As has so often been pointed out, price cuts simply seek to get, on a temporary basis, for a single company, a larger share of a contracting market, —while successful expansion of the market can keep both volume and profit levels on a healthy rising trend.

Another move in the right direction is a nationwide "recession busting" contest, sponsored by National Sales Executives, Inc., with its immediate purpose being to find one thousand sales ideas to stimulate consumer buying. New techniques are being sought in advertising, sales promotion, sales motivation, visual aids, etc., and the best are shortly to be published in a sales

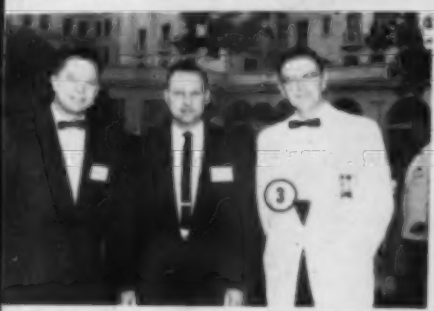
manual, "How To Increase Sales in a Buyer's Market."

One firm in the fertilizer industry has already jumped into the center of things with its own sales campaign. We refer, of course, to International Minerals & Chemical Corporation's "Full Orbit Service" program, designed to help fertilizer manufacturers and mixers sell more goods to their customers. The campaign, we are told, is already a definite success, and is building business for IMC and its customers as well.

Some of these steps being taken by fertilizer manufacturers could very well, we feel sure, be duplicated profitably by their counterparts in the insecticide business. We have seen few industries as backward as the insecticide industry in adequate promotion of its products. Perhaps insecticide manufacturers were spoiled back fifteen years ago with the million of dollars of free publicity the industry received on DDT. They seemed to expect it to happen all over again with each interesting new product that is developed, but they do all too little out of their own advertising and sales promotion budgets to build markets for these promising new pesticidal materials.

Over the past few years we have seen some highly promising new pesticides appear on the market,—a series of new insect repellents, the gibberellins, antibiotics for agricultural use, chelating agents, cattle grub preparations, etc. Each is launched with a nominal sales promotion and advertising budget, and then too often that is the end. The product sinks into oblivion. Not only is it not promoted adequately to the eventual end user, but in too many cases no real continuing effort is made to get the sales story across

(Continued on Page 95)



D. GEORGE HEADS BOARD

Richard E. Bennett, who is president of Farm Fertilizers, Inc., Omaha, Neb., was elected president of the National Plant Food Institute, to succeed John A. Miller, president of Price Chemical Co., Louisville, Ky.

L. Dudley George, vice-president of Richmond Guano Co., Richmond, Va., was elected chairman of the Board of Directors, and succeeds C. T. Prindeville vice president of Swift & Co., in this post.

Other officers of NPFL who have been re-elected are: executive vice presidents, Paul T. Truitt and Russell Coleman; vice-president, W. Raoul Allstetter; secretary, Louis H. Wilson; and treasurer, William S. Ritnour.

Photo Captions

- (1) Mr. and Mrs. A. J. Puschin, Nitroform Agricultural Chem. Div.; W. F. Jacobi, Union Bag Co.; and James M. O'Donnell, Nitroform.
- (2) E. N. Shelton, Tennessee Corp.; R. Goldthwaite, Monsanto; C. E. Workman, U. S. Phosphoric Co.; and G. H. Serviss, GLF Coop.
- (3) S. F. Taylor, du Pont; James Iliff, Davidson Kennedy Associates; and W. O. Frazier, Standard Oil Co.
- (4) Mr. and Mrs. Robert Ashcraft, Ashcraft-Wilkinson; C. G. Gran, Olin-Mathieson Co.; and Mrs. Robert McCall.
- (5) Dallas Cantwell, Southern Nitrogen Co.; W. E. Shelburne, Armour Fertilizer Works, and Joseph Culpepper, Spencer Chemical Co.
- (6) E. Phillips, GLF; L. Kaniecki, Tennessee Corp.; S. Keel, International Minerals; and W. Huff, Ashcraft Wilkinson Co.
- (7) G. W. Suggs, Nitrogen Division; T. H. Bacon, Raymond Bag Corp.; A. L. Spillman, Fertilizer Manufacturing Coop; and G. Urbanis, IMC.
- (8) Mr. and Mrs. R. Parks, Mr. and Mrs. W. Haude, Grace Chemical Co. and R. S. Mueller, R. S. Mueller Co.
- (9) Ralph Waltz, Wilson & Geo. Meyer Co.; S. Nevins, Olin-Mathieson; J. Lawler and G. R. Monkhouse, Shell Chemical Corp.
- (10) D. Gidney, U. S. Potash; O. F. Jensen, du Pont; H. E. Wood, Farmers Fertilizer Co.; F. E. Smith, Potash Co. of America; and John Fletcher, U. S. Potash.
- (11) Ralph Dorland, "Agricultural Chemicals"; Mr. and Mrs. J. Murray, Tennessee Corp.; P. B. Turner, E. I. du Pont.
- (12) D. T. Morris, and J. W. Harding, Federal Chemical Co.; Tom Ware and J. Zigler, International Minerals; and S. Shelby, Federal Chemical Co.

Richard E. Bennett
Elected
President
of
NATIONAL
PLANT FOOD
INSTITUTE

HAVING studied the factors which influence farmers in use of fertilizers and which were determined by the National Plant Food Institute Survey,* the next logical step in stimulating fertilizer sales and consumption is the analysis of "Farmers' Attitudes Toward the Use of Fertilizer," and then "Changing Farmers' Fertilizer Practices." These two topics were thus most appropriate for discussion in two panels featured at the annual meeting of the National Plant Food Institute, held June 15-18 at the Greenbrier Hotel, White Sulphur Springs, W. Va. Contributing their ideas on the most effective approach to the project were NPFI regional representatives and other invited guests presenting views of the dealer, banker, county agent. To summarize briefly, the answer to more fertilizer use seems to lie in: (1) need for elementary education of farmer in fertilizers; (2) farm fertility demonstrations and (3) soil tests and intelligent application of results of these tests.

Changing Farmers' Attitudes

OPENING the panel discussion on "Changing Farmers' Attitudes Toward Fertilizer," M. S. Williams, chief agricultural economist of NPFI, reported on the farmer's present attitude, as determined from the study conducted by the National Analysts.*

He mentioned particularly that most farmers want to improve their fertilizer practices and that a large percentage are making efforts to do so. He also reminded his audience that too many farmers have a very meager knowledge of fertilizer and do not understand a large proportion of the educational and promotional literature on fertilizers they now receive. NPFI's program, therefore, is designed to set up better communications with the farmer to provide more basic education, use demonstrations to influence farmers to use fertilizer, promote soil testing, etc.

*National Analysts, Inc., Philadelphia conducted a survey for NPFI on "Farmers Attitude Toward Fertilizer." A review appeared in *Agricultural Chemicals*, March, 1958, p. 78.

Stating the role state agricultural colleges can take in the program, Dr. Webster Pendergrass, University of Tennessee, indicated that "if enough trained workers were available to explain soil testing, assist with sampling procedures, and adapt recommendations to specific field and crop conditions, there is little doubt that the effort would go far in increasing the use of fertilizer in a practical manner." He suggested the following courses of action "for our colleges and universities to improve their effectiveness in obtaining greater and wiser use of fertilizers":

1. Prepare information in simple, clear, concise terms tailored to fit local situations;
2. Use all available means of mass communications;
3. Expand group efforts;
4. Provide individual counselling;
5. Work with industry on fertilizer demonstrations; and
6. Adapt soil fertility information and activities for youth programs.

"The level of knowledge of farmers interviewed indicates the need for some very elementary education in fertilizers," he said. "Such things as fertilizer grades and ratios may appear to be too simple to explain to farmers, but the study* indicates a dire lack of such knowledge."

"Let us realize the possibilities of mass communication, but at the same time not become complacent in the belief that the total educational job is being done through such channels."

Dr. Pendergrass said that he was "afraid too little attention has been devoted to the economics of fertilization and increasing the farmers' understanding of fertilizer use in relation to the fertility level of the soil."

"Training meetings should go much further than the farmer," he said. "Too few agricultural workers have sufficient knowledge of soil fertility to be able to solve farmer problems in a simple and practical manner."

"The value of demonstrations was apparent to many of the farmers interviewed, but such value was evident only when demonstrations were called to their attention and observed by them," he pointed out. "It would

appear that an important lesson for the colleges in this connection is to continue with demonstrations, but involve in them the trade, other agricultural agencies, farm organizations and many more farmers." He concluded that "demonstrations are of little value unless they are called to the attention of interested farmers."

Speaking for industry, W. E. McGuirk, Jr., president, Davison Chemical Company, Division of W. R. Grace & Co., Baltimore, said that "we have a product that can do a job for the farmer, we have a solid story of the contribution fertilizer can make," and "we must initiate a powerful unified selling effort to raise understanding of our commodity among farmers."

Mr. McGuirk noted that "the National Analysts study (of Farmers' Attitudes Toward the Use of Fertilizer) seems to indicate that our individual advertising efforts have measurably failed, witness the fact that over 50 per cent of the farmers do not even understand the terms used to describe fertilizer, much less how the use of fertilizer can make money for them."

"I think the time has come for changes," he advised, adding that "first, we can accept the fact that no one company has the funds to put on an advertising and sales promotion campaign of the magnitude that is needed for our industry."

"The only alternative, therefore, is to devise, through the National Plant Food Institute, an intensive joint education, advertising, and sales promotion program. The best talent in the country must be contacted to develop our plant food story and then take it to the farmer. After determining the cost, we must contribute on a tonnage basis to carry our message to that uninformed and untapped 50 per cent of the nation's farmers."

Mr. McGuirk recommended to the convention "that a committee be named to explore the possibility and budget of a promotional program and bring their recommendations before the membership at the earliest possible moment."

W. R. Allstetter, vice president of NPFI, reported to the membership

on "What the National Plant Food Institute is Doing," and called on various district representatives to comment on regional factors and influences.

From the Far West . . .

Richard B. Bahme, district representative of NPFI at San Francisco stated that "fertilizer is an important weapon in helping farmers to combat adverse weather in connection with crop production." NPFI, he said, is supporting research to determine how fertilizer may help the farmer cope with adverse weather. Sound research on range fertilization where moisture is restricted to natural rainfall in arid areas of the West already indicates how fertilizer improves water use and produces increased forage. Fertilizer may also improve growth of plants at low temperatures when nutrients may become limiting. "Additional research," he indicated, will contribute to developing new fertilizer markets."

From the Midwest . . .

Motivation rather than lack of ability keeps many farmers at low crop yielding levels, stated Zenas H. Beers, director of the midwest regional office of NPFI, Chicago. "To help farmers establish sound production programs," he said, "the NPFI has launched a 'Crop Production Potentials' program in several midwestern states. This was developed in cooperation with soils specialists at the agricultural colleges."

The Institute's midwest office has prepared and distributed wall charts for Illinois and Wisconsin showing the major soil areas of each state, plus information on the potential yields in each and the management methods needed to achieve them. The Institute has also prepared localized check lists giving farmers specific facts on the soil types in their areas, and the crops suited to their soils.

"Progress in the job of informing and motivating farmers to do a better job with the resources they have available," he said, "is a matter of cooperative undertaking between the fertilizer industry, the colleges and others who share in the agricultural community."

From the Southeast . . .

Samuel L. Tisdale, southeast regional director of NPFI, said "the fertilizer industry in most southeastern states can, by effectively encouraging soil tests, double its sales. However, there are some areas, notably Florida, where our members have raised serious questions about the value of current soil testing procedures, and I am excluding Florida from my remarks."

Estimated fertilizer needs in the Southeast are great, and the National Analysts survey clearly indicates the importance of the soil testing technique as a means of increasing fertilizer use on most crops in most states. In one of its programs in about 27 states, including several in the southeast, the Institute is providing mats for use by bankers for advertising in local newspapers, with messages "urging their farm customers to use adequate fertilizer and lime and to do so on the basis of a sound soil test." Dr. Tisdale said, "It is our intention to expand this program as quickly as possible, for it is of great importance to us . . . to have members of the banking industry better acquainted than many of them now are, with the importance of fertilizer to their farm customers."

From the Southwest . . .

"Farm fertility demonstrations are playing an increasingly important role in getting more farmers to use fertilizer at recommended levels and concerted efforts are being made in the Southwest to get more farmers to see more demonstrations," advised Dr. Robert L. Beacher, director of the southwestern regional NPFI office at Fayetteville, Ark.

"The increased emphasis is heartwarming because a recent survey of the Institute shows that farmers overwhelmingly approve of demonstrations and are favorably influenced toward fertilizer use when they see them. Notwithstanding that hundreds of demonstrations have been conducted, over two-thirds of the farmers surveyed in the Southwest still said they had never seen any such demonstrations. We are working with the land-grant colleges in every way possible to increase the number seeing the tests."



From the Northeast . . .

Dr. William H. Garman, NPFI Northeast regional director, reported that "soil testing provides the most practical tool whereby farmers can expect to realize the greatest returns on a dollar invested in fertilizer. However, soil testing is no better than its practical application on the farm. Unless more farmers use soil tests and follow the recommendations, farm income in most states will remain at low levels in comparison with where it should be.

While there is no panacea for success in farming, there are many sound practices which as yet are not followed by most farmers." Soil testing, he advised, is an excellent example of one of these. "To the extent of our ability, we are assisting the established research and educational agencies, and the various communications media, in their dedicated efforts to raise agriculture to an efficiency level comparable to that of our other major industries."

From the Pacific Northwest . . .

F. Todd Tremblay, NPFI representative of the Pacific northwest district office at Seattle, Wash., stated that "even during the period of agricultural economic stress, farmers in the northwest continued to use more plant food,—the obvious reason for

—Photos—

- (1) T. C. Rogers, Nitrogen Division, and W. B. Porterfield, National Potash Co.
- (2) J. H. Bryant, and L. H. Wright, Phillips Petroleum Co.; C. H. Lamoreaux, Standard Oil Co.
- (3) Monsanto Chemical Co. group who organized breakfast for ladies at the 3-day meeting.
- (4) Mr. and Mrs. Frank Kennedy, Potash Co. of America.
- (5) Mr. and Mrs. W. S. Ritnour, and Mr. and Mrs. Vincent Sauchelli, National Plant Food Institute.
- (6) Mr. and Mrs. G. E. Garland, Texas Co.
- (7) J. Sitton, New Mexico Potash Industry; G. F. Coope, Potash Co. of America, and W. C. Stark, Atlantic Fertilizer Corp.

this increase being that it is paying dividends to the farmer in the form of more net dollars return per acre." Still,—he added, an even more extensive educational program is needed in the Northwest to demonstrate the merits of making correct use of fertilizer on the various crops grown in the region.

"In addition to making practical use of the knowledge that we have already accumulated, additional research is needed on fertilizer use throughout the area. Much more re-

search is needed on rates, ratios, and placement of fertilizer on all the crops grown in the irrigated areas throughout the West. The Institute is not only interested in sponsoring research projects to develop this information, but is interested in helping to evaluate the results from an economic standpoint, and getting this data out where it can be used by the farmer."

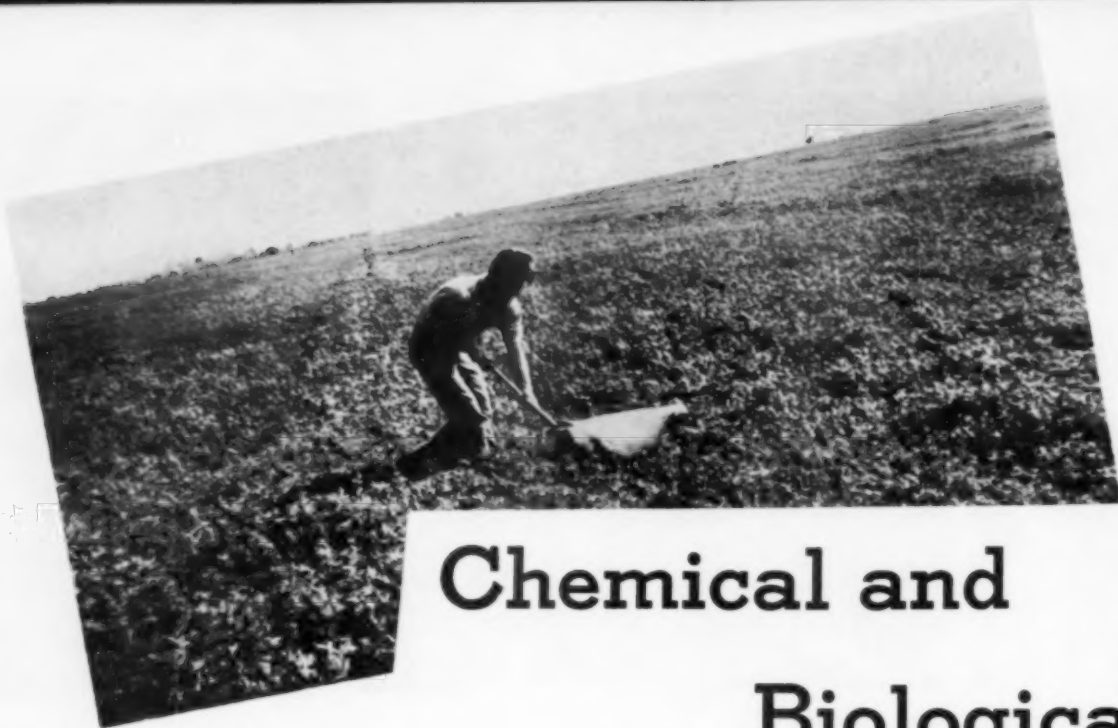
Changing Farmers' Fertilizer Practices

GIVING the dealer's view on the need to change farmer's fertilizer practices, Orville Buerge, Buerge Bros., Harrisonville, Mo., confirmed the opinion that soil testing is probably one of the most important factors in a successful farm operation. "We have actively supported the soil testing program, have encouraged it by paying the charges for soil testing, also by furnishing soil sampling bags, and we have even assisted farmers in taking soil samples. It is a proven fact that all of this has paid big dividends to all concerned within our territory here in western Missouri."

Comments from a County Agent . . .

J. W. Clark, Dane county agent, Madison, Wisc., told NPFI members that "the trick in making education effective is to make it do its job at the

(Continued on Page 87)



Chemical and Biological

IT is becoming increasingly evident that biological control and chemical control are not necessarily alternative methods; they may be complementary and, with adequate understanding, can be made to supplement one another. We use the term biological control in its broadest sense, that is, the manipulation or use of biotic factors in the environment to reduce and hold pest populations below their economic threshold. In the past biological control has been concerned largely with the importation and establishment of natural enemies of insects and other pests. Gradually efforts in this field have extended to other aspects such as the better utilization of natural enemies already present in an area. Because of the importance and need for chemical control in many situations, better utilization of natural control forces demands the development of comprehensive control programs in which both biological and chemical methods of control are used to their fullest extent. This is also necessary if excessive use of insecticides is to be avoided.

Not all economic entomologists agree to this approach. For example, as recently as 1955, T. H. C. Taylor stated "... attempts to use [biological

control] in combination with chemical methods are, in general, foredoomed to failure, biological and chemical methods being incompatible." (27) On the other hand, the evidence that the two types of control can be used together is mounting; it has come from many sources involving many kinds of pests in varied situations (9, 17, 19, 28, 32, and others).

In view of certain trends resulting from the use of insecticides, such as the development of resistant strains in species that were previously easily controlled (12), and the rise to importance of species that were previously innocuous (19, 21), it would seem worthwhile to examine more closely the evidence for compatibility. We shall attempt here to analyze why chemical control and biological control have been incompatible in most instances in the past, and why we believe that the examples where they have been used together successfully are indications of the insect control methods of the future. Much of what we have to say has been said before, in some cases long ago (e.g. see 2, 5, 6, 7, 16, 18, 22, 23, 24, 28, 29, 30, 31); but it seems necessary to say it again.

The Ecological Approach

ONE of the main reasons for the apparent incompatibility of biological control and chemical control is the failure to recognize the control of insects as a complex problem in ecology. It is shortsighted to develop a chemical control program for the elimination of one insect pest and ignore the impact of that chemical program on the other insects, both beneficial and harmful. But it is no worse than attempts to utilize parasites for one pest without considering the chemical control measures that may be necessary for other pests on the same crop.

Many advocate the ecological approach to insect control; few practice it. Not until some of the basic principles of ecology are recognized in insect control, and utilized in the manipulation of insect populations, will it be possible to use both chemical and biological control methods to their full potential. This is not the place for a treatise on the principles of population dynamics, but it appears to us that several important aspects of natural control are often ignored. Man has developed huge agricultural areas devoted to a single crop or to a few crops. He has des-

Methods of Pest Control

by
Kenneth S. Hagen
and
Ray F. Smith

University of California
Berkeley, Calif.

troys forests, developed special strains of plants and animals, moved them about, and in other ways altered the natural balance that had developed over thousands upon thousands of years. We could not return to these original balanced conditions even if it were desirable. However, we may utilize some of the mechanisms that existed before man's modifications, to establish new balances in our favor.

To do this, it is necessary first to recognize the "oneness" of any environment — natural or man-made. The populations of plants and animals (including man) and the non-living environment together make up an integrated unit called the ecosystem. If an attempt is made to reduce the levels of one kind of animal (for example, a pest insect) by chemical treatments, modification of cultural practices, or by other means, other parts of the ecosystem will be affected as well. For this reason, the production of a given food or fiber must be considered in its entirety. This includes simultaneous consideration of

insects, diseases, plant nutrition, plant physiology, and plant resistance, as well as the economics of the crops.

Disrupting effects of a chemical treatment may not necessarily stem from the elimination of natural enemies. They may be on the plant which in turn affects the development of the pests. The increase of spider mites on plants growing in soil receiving chemical treatments is a well-known example of this.

With most ecosystems, some potentially harmful forms are held at sub-economic levels by regulating factors. In other instances, the pests are held below economic levels only part of the time. A pest species may be under adequate natural control when considered over a large area or for a long period of time, but not from the standpoint of individual fields or the "short term." In a single field or orchard, or during a portion of a year, the pest population may rise to economic levels, while in other areas the pest may be sub-economic. It is in such situations that compatible control programs are especially important. These occasional destructive populations must be reduced in a manner that permits the natural control which prevailed before or prevails elsewhere to take over again. If a chemical control disrupts the natural control without eradication of the pest, then

repeated treatments become necessary. Precise knowledge of the insect population levels, measures of reasonable and sound economic thresholds, and, in many cases, selective insecticides are necessary to develop such compatible control programs.

Economic Thresholds

THE lack of a sound measure of economic thresholds of insect damage related to population levels, in many cases, has been another major stumbling block to the development of compatible control programs. The economic threshold for a pest insect on an agricultural crop is the lowest pest population level which is capable of causing economic damage. Our changing economy, variations in consumer demand, and the difficulty of measuring the effects of insects on yield and quality often make the assessment of economic damage extremely laborious. In some cases, no economic threshold level has been established and the mere presence of a single pest is a signal to treat. In other cases, there is no scientific basis for the vague treatment levels utilized; they have become established by guessing and by usage.

Growers concerned with food crops that will be canned or frozen before marketing have a special problem. In some instances they are forced

to utilize low treatment levels because of the very low tolerances for insects and insects' parts in processed food. Phytophagous insects, such as thrips and aphids, are in our personal view, and that of entomologists generally, not filth nor are they harmful in food. When insect parts are an indication of unsanitary conditions and health hazards, however, the regulations are scientifically justified but not otherwise. Some treatment programs for thrips on berries are extreme examples. It is a self-defeating situation in which the organization concerned with holding chemical residues to a low level in foods is at the same time responsible for the very low economic thresholds for pest insects, and thus creates the need for numerous insecticidal treatments on these same crops. More reasonable and realistic economic levels are necessary before compatible control can develop to its fullest. Success is dependent on a program which has the aim of holding insect populations below scientifically established economic levels rather than one which attempts to eliminate the insects.

It is realized, of course, that there are some control problems where the economic threshold is extremely low. The levels at which insect vectors of plant disease must be held to prevent the spread of disease are often so low that we cannot expect natural enemies to be effective. The same is often true of vectors of human and animal diseases (22, 26).

Population Sampling Methods

IF insecticidal treatments are to be timed according to population levels, then adequate sampling methods utilized by most research investigators for experimental plots are usually too time-consuming and tedious to be of practical value in establishing pest population levels in commercial crops. Special index methods are needed which are rapid and simple to use. Ideally these should be of such nature that the farmer can use them without interfering with his other farming responsibilities. The grower will not be able to do this in all situations because of the difficulties and complexities involved in the deter-

mination of the status of some pest populations at the times of the year when they must be controlled. Sequential sampling techniques may be one method of stream-lining the determination of population levels. In some instances, qualified entomologists will be required to evaluate the populations.

One answer to this sampling problem has been the development of "supervised control" in California, Arkansas, Arizona, and elsewhere. In a supervised control program, the farmer, or a group of farmers, hires an entomologist to follow the insect populations. On the basis of his population counts, other conditions peculiar to the particular field, and his knowledge of the ecology of the pests and their natural controls, the entomologist makes predictions as to the course of the population trends and advises as to when controls should be applied.

For instance, in the case of the alfalfa caterpillar, when economic thresholds are reached, the recommended procedure may involve immediate cutting of the hay crop, without treatment, or application of a disease pathogen, or treatment with an insecticide. The course to be taken depends on the characteristics of the particular infestation.

Fixed Spray Schedules

OVER a period of many years, elaborate spray schedules have been developed for many crops, giving fixed times to apply chemicals. Some of these are prophylactic treatments to guard against frequently recurring pest problems; others amount to insurance treatments for the occasional infestation that cannot be predicted by means currently available. Treatment times are usually based either on the stage of development of the crop or season of the year rather than on pest population levels. It is impossible to integrate biological control with such inflexible spray programs.

Wherever possible, knowledge must be developed so that we can predict the times when occasional pests will be present in outbreak numbers. This will eliminate unnecessary and

environment-disturbing insurance treatments. In other instances, the treatments can be timed according to the actual pest population levels as is now done with many field crop pests. Where prophylactic treatments are proved to be necessary for a perennial pest, selective materials should be developed and utilized to foster natural control of other pests.

With those crops that do not yet have fixed spray schedules, every effort should be made to plan a program dependent upon pest population levels and to avoid dependence upon insurance and prophylactic treatments. If this is not done, there is real danger that these crops, too, will soon develop more and more pest control problems.

Even if our knowledge were adequate today to outline an ideal integrated control program for a crop now utilizing an intensive fixed spray program, it would not be possible to switch to a compatible control program immediately. The effects of the previous treatments may last several years. In some instances, effective natural controls no longer exist and would have to be re-established. This may be a slow process (3, 5, 17).

Selective Materials

CHEMICAL control programs are limited by the nature of the available insecticides. In the past non-selective insecticides applied for one insect in a pest complex often have eliminated the biotic factors holding other pests in check. More recently, we have had available a greater variety of materials of which some are selective in their actions on the insect complex. These materials, which spare some of the beneficial forms while reducing the harmful ones, are termed selective insecticides (18, 20). In some instances, a disease pathogen may be used as a selective "insecticide." Under supervised control in the Dos Palos area of California, a virus affecting the alfalfa caterpillar has been used successfully either alone or in combination with insecticides to avoid the use of a non-selective treatment.

The recent development of the use of low dosages of demeton for
(Continued on Page 89)



BLASTING FERTILIZER

THE Agricultural Chemicals Division of Canadian Industries Ltd., Montreal, has published a handbook describing the safe and efficient use of explosives in the blasting of fertilizer which has caked in bin storage.

The company points out that the blasting of fertilizers is becoming a lost art because of a tradition blasting operators tend to have of passing on their knowledge to another operator in much the same way as were trade secrets in the early days of manufacture. In addition to describing the techniques of fertilizer blasting, the booklet discusses the storage of explosives and blasting caps with a special emphasis on safety.

The position, depth, and number of holes to be drilled in caked fertilizer will depend on conditions such as size of building, location of pile, and the charge required. While a blaster may be quite capable of conducting the work alone, a second man should be present, for safety reasons, in the event of an overhang coming down, or to lend assistance if needed.

Caps and explosives can be carried by one man to the working place,

providing he keeps them in separate, suitable, closed containers. Before loading any holes, the depth should be checked with a tamping stick. This also will determine if the hole is in proper condition to accommodate the charge. No attempt should be made to charge a borehole unless it is large enough to accommodate the cartridges without forcing them into place.

Primers should be made up at the blasting site and should be placed in the mouth of the hole, with the cap pointing toward the mouth. The other cartridges then should be placed in the hole and the complete charge pushed back as a unit with the tamping stick. The primer cartridge never should be slit and should not be tamped. If the cartridges cannot be pushed to the required depth, they can be retrieved by pulling gently on the leg wires which are attached to the cap.

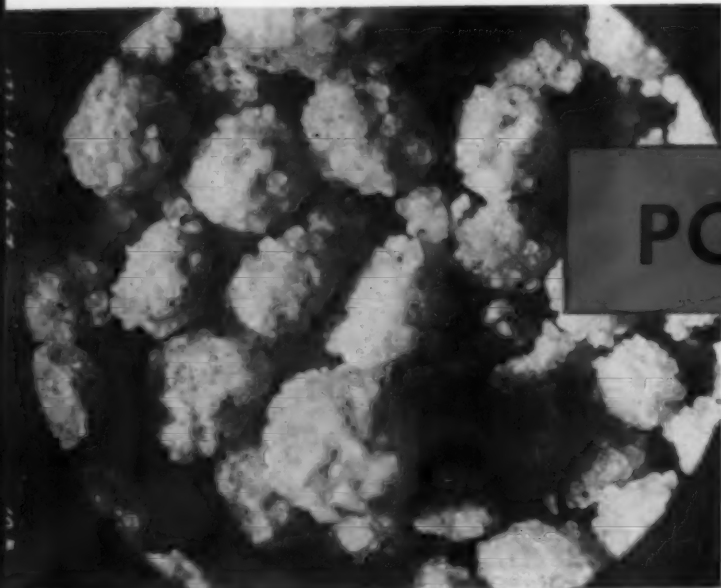
Each hole should be stemmed to the collar or mouth of the hole with fines, then tamping solidly in place with the loading stick to obtain maximum confinement of the charge. All caps are hooked in a single series so as to provide a single path for the current. This is done by connecting a leg wire of one cap to one of another cap, the other wire

from the second cap to one from the third cap and so on until all caps are included in the circuit.

A copper, brass or wood powder punch is required to form a hole in the cartridge to accommodate a cap. Blasting caps, as well as high explosives, can be detonated by shock, impact, friction, heat, flame or sparks and, therefore, should be handled carefully.

In connecting the wires in electrical blasting operations, it is important to make firm, tight joints which have good mechanical strength and which offer negligible resistance to the current flow. When all caps have been connected into a single series, the series should be checked for resistance and continuity with a galvanometer. The series then can be connected to the lead wires and the complete circuit checked with the galvanometer before connecting the lead wires to the blasting machine. The lead wires always should be kept short-circuited by twisting the ends together near the blasting machine until ready for use. They should be long enough to enable firing of the blast from a safe distance in a protected area and they should not be allowed to contact any other source of power or any possible source of stray current.

When firing a blast, blasters should be sure to take sufficient cover
(Continued on Page 92)



POTASH Sizes

Part 2

This discussion on optimum mesh size of potash for granulation and blending with other coarse materials is the conclusion of a 2-part symposium originally presented at the Fertilizer Industry Round Table, held in Washington, D. C., in 1957. First part of the symposium appeared in *Agricultural Chemicals* June issue.

Fig. 3

By J. G. MacArthur
Spencer Chemical Co.

THE question as originally stated was, "Do you have any experimental data on the relationship of potash to particle size, on-size product before screening, recycle load or homogeneity of the granular fertilizer?". Although in no way complete, some information was obtained during start-up operation of a commercial fertilizer plant which demonstrated, to a degree, the effect of varying the quantity of coarse potash and filler in the production of various fertilizer grades.

Figure 1 is a picture of four different fertilizers, and shows visually the degradation in particle size as the amount of coarse potash used in a formulation is decreased. Reading from left to right materials are:

Beaker 1; an 8-8-8 manufactured with fine potash and included for comparative purposes.

Beaker 2; contains 3-9-27.

Beaker 3; 3-9-18.

Beaker 4; 4-12-4.

All materials are finished products and were taken as a 6/20 mesh cut from the process stream. The degradation in particle size, as the amount of coarse potash used is decreased, is apparent.

Table 1 shows formulation and some operating data for the various fertilizer grades. Commenting on this briefly, the 8-8-8, even though it contained 500 pounds of filler, had suf-

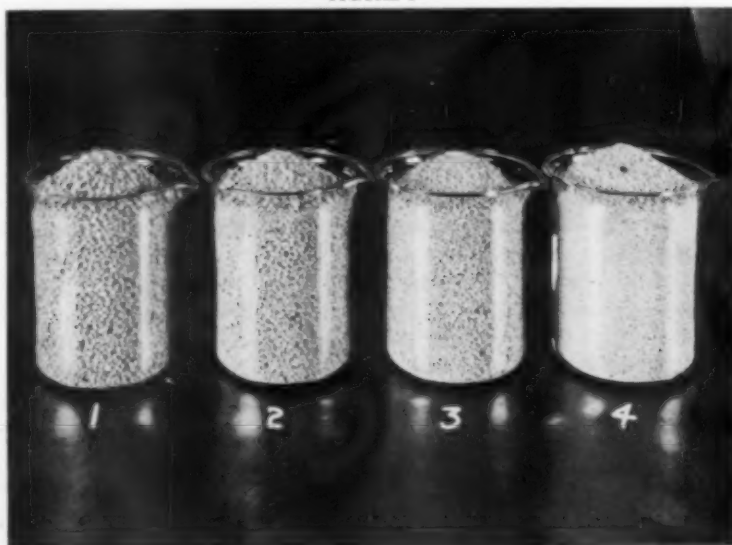
ficient heat-furnishing reactions and soluble binding agent present to agglomerate adequately, in fact, the throughput percentage of 162 indicates that it was necessary to bring back some recycle as a granulation control. This condition did not exist in the other three grades.

In case of 3-9-27; 3-9-18, and 4-12-4, it was found necessary to add extraneous heat to maintain the ammoniator temperature in the neighborhood of 200°F. This was accomplished by feeding live steam beneath the bed of fertilizer. It is worthy of note that as the amount of coarse potash added decreased, the demand for steam and total moisture increased. It is also

worthy of note that although 3-9-27 and 3-9-18 contained over 1,000 pounds of material normally considered difficult to granulate, namely potassium chloride and dolomite, and the 4-12-4 contained only slightly over 700 pounds of these materials, the first two grades appear to have a larger particle size. This condition has been attributed to two factors: namely, the overall particle size of the raw materials initially fed to the system were larger, and the undersize particles did lend themselves as nuclei for fertilizer granules.

Table 2 shows the difference in sieve analyses for the various raw materials and mixed fertilizers with

FIGURE 1



the following amount of each raw material being held on a 20 mesh sieve:

Fine Potash	18.6%
Dolomite	44.6%
Coarse Potash	82.6%

Analysis of the materials exit the cooler, that is before separation and grinding of the oversize and separation of the recycle, shows little indication for particle size degradation in the first three grades. However, the 4-12-4 shows a 20% decrease in the amount of material held on the 20 mesh when compared to a 3-9-18 or 3-9-27. Finished product analysis shows a general degradation of the last three grades.

Figure 2 is a photomicrograph showing nucleation of fertilizer particles by coarse potash and other materials. The granule in the lower part of the picture shows quite plainly a crystal of pure potash in the

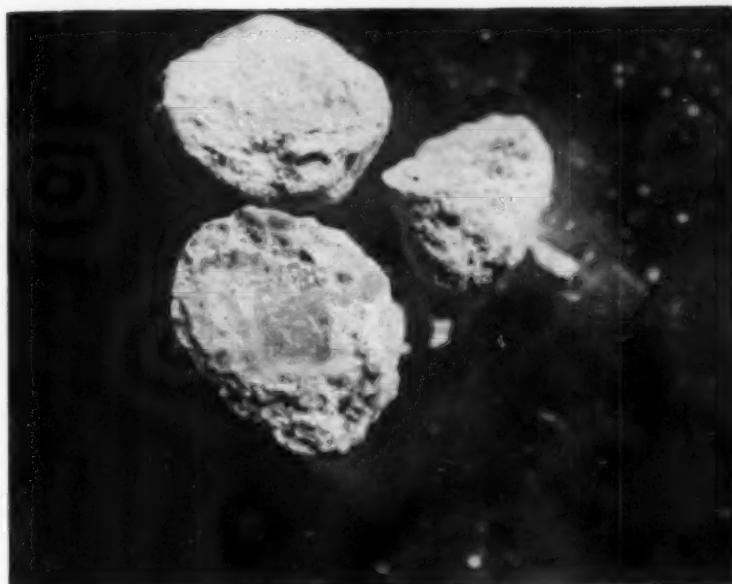


Table 1

GRADE	8-8-8	3-9-27	3-9-18	4-12-4
Formulation #/ton				
Ammoniating Solution 37%	433	108	109	162
Anhydrous Ammonia 82%	—	25	25	25
Sulfuric Acid	98	—	—	—
Superphosphate	800	915	900	1200
Potash (Fine)	267	—	—	—
Potash (Coarse)	—	900	600	133
Filler	500	110	412	575
Total	2098	2058	2046	2095
Production T/hr.	12	15	12	10
Recycle T/hr.	7½	2¼	3	¾
Throughput				
% of Production	162	115	125	108
Ammoniator Temp. °F.	195	205	211	209
Steam Feed #/ton	—	107	133	160
Water Feed #/ton	—	83	73	88
Total Added #/ton	—	190	206	248

Table 2

	Dolomite	Potash (Coarse)	Potash (Fine)	8-8-8	3-9-27	3-9-18	4-12-4
Held on					Cooler Exit		
6	0.8	0.0	0.0	21.9	19.5	16.0	2.3
14	27.2	31.5	0.5	82.9	79.0	83.5	63.5
20	44.6	82.6	18.6	94.1	95.5	97.5	90.4
40	62.2	96.1	82.9	99.5	99.5		
65	89.0	98.8	97.2				
Held on					Finished Product		
6				5.4	5.5	0.0	0.0
14				70.8	76.0	73.2	29.6
18				98.3	98.0	88.7	42.1
20				100.0	99.5	99.9	97.0
40							99.9

center. Close examination shows other smaller particles of potash scattered throughout the matrix, around the

outside. Apparently, concentration of a large quantity of the potash carrying materials in the center of the particle left enough matrix and soluble materials to bind effectively the remaining insoluble material into the granule. The particle directly above that containing the potassium chloride crystal had a nucleus of a dolomitic limestone, whereas the third particle, which by the way is not very visible in this picture, has a nucleus of superphosphate.

Figure 3 is another photomicrograph of a fertilizer grade, this time 4-12-24 manufactured with fine potash. This material was manufactured in a small bench-scale fertilizer unit, and although very few fines were obtained exit the ammoniated granulator, a small amount of handling caused appreciable breakdown of the particles.

This grade was not demonstrated on a commercial basis; however, attempts to granulate a 3-9-18 using fine potash met with failure due to extreme dusting and inability to consume the large amount of recycle sent back to the ammoniator. It should be pointed out that the filler can also be critical in manufacture and in the case of one grade, namely 3-9-18, when a silica type filler was substituted for the dolomitic limestone, satisfactory granulation was not achieved.

A Discussion of Factors Affecting Optimal Potash Size

John Hardesty

USDA, Washington, D. C.

EXPERIMENTAL data, as well as data from commercial- and pilot-plant practice, indicate that the optimal particle size of potassium chloride for obtaining high product yields of granular mixed fertilizers is not the same as that for obtaining uniform nutrient distribution in the product. These data are available in the literature cited at the end of this report and indicate that:

- (a) Solid potassium chloride tends to resist agglomeration with itself (11) and with other ingredients of the fertilizer mixture (3), (12, 18).
- (b) The resistance to agglomeration is most apparent in the low-nitrogen, high-potash grades (3), (12).
- (c) As would be expected, an increase in the proportion of granular potassium chloride in the initial mixture, especially if it is the same particle size as that of the granulated product, increases the yield of granulated product and reduces the yield of recycle fines (12, 18). A particle size of 8- to 14-mesh* potassium chloride may seem optimal for producing high product yields of low-nitrogen, high-potash grades, but it does not contribute to homogeneity in the finished product.
- (d) Distribution of plant nutrients among granules of the final granulated product becomes less uniform as the particle size of the initial materials approaches that of the final product (6, 10, 17). The result,—if the procedure is carried to its ultimate limit,—is a mixture of (a) granules of individual materials, in which no agglomeration has occurred, or (b) granules of crushed over-size, in which the low degree of agglomeration has resulted

in poor distribution of plant nutrients. Either type of product is inferior to a granulated mixture in which a high degree of agglomeration has caused a wide distribution of initial ingredients among the granules of the product. Plant nutrient distribution is far more uniform in a granulated product made from materials passing a 40-mesh screen than in one made from materials of which an appreciable proportion is retained on a 20-mesh screen (10).

- (e) A comparison of the relative volumes of spherical granules of equivalent density shows that, even though an 8-mesh particle of potassium chloride is uniformly coated with the other ingredients of a 5-20-20 mixture, it is not possible for the final granule to be up-to-grade in the 6- to 20-mesh product fraction. It can only be up-to-grade in the over-size fraction.

The data in the references cited indicate that (a) all initial materials for use in granulation processes should be finely-divided, and (b) initial granular materials, when used as a production aid, preferably should include no material larger than 10 mesh in particle size.

General Comment:

The successful operation of a modern fertilizer mixing plant calls for professional skills and knowledge that previously were not necessary in making mixed fertilizers. The physical sciences are now being applied to the production of fertilizers. The questions presented here for discussion in the 1957 Round Table Conference are evidence of this transformation. Some of the questions refer to problems that have not been fully explored. They point to the need for further applied research in the field of fertilizer technology. As

rapidly as the answers to these questions are obtained they will ordinarily appear in scientific, agricultural, and trade publications.

Plant personnel who are responsible for the production of mixed fertilizers usually find that a systematic inspection of the technical literature yields valuable assistance in solving many production problems.

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Eptam Granted Registration

Eptam (EPTC) recently was registered by the United States Department of Agriculture for use on a number of crops. The selective herbicide, a product of Stauffer Chemical Co., New York, has been field-tested throughout the country for the past three years. This spring output was increased substantially for the expanded field testing program the company is conducting nationally and in foreign countries.

Among the crops on which the use of Eptam has been registered are table and sugar beets, flax, forage legumes such as alfalfa and clovers, field and sweet corn, snap beans, strawberries and ornamentals.

* Mesh size in all cases refers to the opening in Tyler Standard Screen Scale Sieves.

PEST CONTROL

in

India

by Nitly Nair

Mr. Nair is a graduate of the University of Saugor in India. He received the Rotary International Fellowship for higher studies and practical training in plant protection while serving with the Indian government. He is now on study leave, and working as a research assistant in the Department of Entomology at Purdue University. The following article has been submitted with the permission of Purdue University.



SINCE 1948, pest control programs in India have received far greater attention than ever before. This progress was due to many factors, among which the following were perhaps the most important.

First, one of the effects of the second World War was the neglect of good agricultural practices. Consequently during the post-war struggle for more efficient crop production, plant protection became important.

Second, the benefits resulting from the discovery of organic pesticides, especially DDT and BHC, contributed greatly to the widespread appreciation of the importance of pest control.

Third, International programs (e.g. International Cooperation for Locust Control) and bilateral agreements between India and other countries under the Technical Assistance Program have contributed to the wide-

spread consciousness of the importance of agricultural pest control work in modern agriculture.

This paper reviews (1) some of the problems involved in insect control and the purpose of the Plant Protection Scheme, (2) the important pests of cotton and sugarcane and the chemicals used for their control, and (3) biological control in India.

Problems

Agriculture in India poses a number of problems in pest control, because of the contrasting climate between the various states. On one hand this has resulted in the cultivation of a wide range of crops—from tropical to mediterranean—and on the other hand it has resulted in a corresponding increase and diversity in insect pests.

Another factor is that crops are now grown on land that is more

fertile, which produces more luscious plants. Consequently insects multiply more rapidly and live longer than under the less favorable host conditions that once existed.

Another phase of the problem is the lack of laws concerning market grading of crops, vegetables and fruits. Thus, because of the food shortage, everything that is grown finds a ready market.

The low purchasing power of a large section of the farmers, prevents the acquisition of mechanical equipment to fight insect pests. Perhaps, this is one of the biggest problems facing the modernization of plant protection schemes.

Plant Protection Scheme

Plant Protection Schemes were organized by the various states of India with a view: (1) to organize the control phase against the major pests and plant diseases on a field scale; (2) to help the farmers, etc. in undertaking such control measures themselves and also to assist them to obtain promptly and cheaply insecticides, fungicides and spraying and dusting equipment.

Thus, for instance, the three southern State Governments of India at first subsidized two thirds of the cost price of the insecticides bought. This subsidy was reduced to half in 1950, one quarter in 1952 and totally abolished in 1954. This help by the Government under the plant protection scheme has not only helped the farmers monetarily but also has helped a great deal to popularize the use of insecticides; (3) to give the growers technical advice with practical demonstrations; (4) to warn farmers against the possibility of pest and disease outbreaks; (5) to persuade them to adopt timely measures against pests and diseases and (6) to enforce quarantine laws.

Cotton Pests and their Chemical Control

INDIA is the second largest producer of cotton in the world. It is second only to the U. S. in cotton production. The cotton crop in India is subject to attack by many insect pests. In some states, some of these

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have assumed the status of serious pests, and become a major problem affecting the cotton acreage. Except for the spiny bollworm, which is resistant to most of the commonly used taining BHC, DDT and sulphur, or toxaphene and sulphur have been used with success against most of the other cotton pests. Endrin has been used with success in the control of spiny bollworm. Malathion has proved effective in the control of mealy bug. Tobacco decoction (12 lb. + 1½ gallons of water + ½ lb. of soap) spray when used in the early stages of the crop is very effective against cotton thrips. Cotton woolly mite, which lives under the tissues of the epidermis of the leaf has been controlled effectively by spraying the affected plants with lime sulphur wash (1 part of lime, 2 parts of sulphur and 15 parts of water diluted 8 times again before spraying.)

Sugarcane Pests and their Control

Sugarcane is an important crop in India. It is subject to attack by many insect pests common to this crop (Table 2).

DDT and BHC have found an important place in the control of sugarcane insect pests. Dusting seedlings of sugarcane with DDT or BHC to cover the opening blades has helped in the control of the sugarcane seedling borer. The top shoot borer is usually kept in check by dusting 5% DDT. When the cane is three months old, sugarcane leaf hopper is controlled effectively by dusting the affected areas with BHC (5 to 7%). Control of the sugarcane mealy-bug is obtained by steeping the setts in water for nearly 48 hours before planting. Addition of paraffin or kerosene oil emulsions diluted to 30 times or 40% nicotine sulphate (1 in 800 parts of water) is also recommended. Planting of arsenate-soaked setts has helped to some extent in the control of the sugarcane termite. Naphthalene or paradichlorobenzene has been recommended to be incorporated in the soil to a depth of 2-4" around cane clumps showing withering effects due to sugarcane root grub.

(Continued on Page 92)

Table 1. List of important insects of Cotton and the nature of their damage

Pink bollworm	Caterpillars bore into the bolls and damage them.
Spotted bollworm	Caterpillars bore into tender twigs and developing bolls.
Spiny bollworm	
Leaf-roller	Caterpillars feed on leaves and roll them.
Green semilooper	Caterpillars feed on leaves and defoliate the plants.
Jassid or leafhopper	Sucks the sap.
Cotton stemborer	Grubs bore into the stem and cause wilting.
Cotton aphid	Adults and nymphs suck the sap of tender portions of plants.
Stem weevil	Grubs bore into seedlings just at ground level, form galls and destroy seedlings.
Shoot weevil	The lateral shoots are tunnelled in the center, preventing normal growth and formation.
Red cotton bug or Stainer	Adults and nymphs damage the bolls and stain the lint within.
Dusky cotton bug	Adults and nymphs damage the bolls and stain the lint within.
Mealy bug	It de-saps the plant.
Cotton bud moth	
Gram caterpillar or American bollworm	The caterpillars feed on leaves. They seriously injure the developing cotton seeds by biting holes thru the boll.
Thrips	Both adults and nymphs damage plants by lacerating tissue and sucking up sap.
Cotton woolly mite	The mite lives under the tissues of the epidermis of the leaf and causes a growth of dense whitish hairs on both surfaces of leaf and the stem.

Table 2. List of important insects of Sugarcane and the nature of their damage

Sugarcane seedling borer	The larvae bore into the stems of the young plant and feed on the contents, resulting in the death of the central shoot commonly known as a "dead heart."
Top shoot borer	The larvae bore 4-5 nodes of the top shoots of sugarcane, curling and drying up the leaves, forming "dead hearts."
Sugarcane root borer	The larvae attack and damage root stacks of sugarcane. The sugar contents of the growth are enormously reduced.
Cane stem borer	The larvae bore into the stem and cause "dead heart."
Sugarcane leafhopper	Both adults and nymphs de-sap the plant, cover the shoot with a sticky secretion which attracts harmful fungi. Saccharose percentage falls down 50 percent.
Sugarcane mealy bug	Heavy infestation results in stunted growth and often ultimately kills the plants.
Sugarcane termite	Cane setts planted underground are badly damaged which prevents germination, the setts and bugs being completely eaten up and hollowed out.
Sugarcane white fly	Desaps the plant.
Sugarcane root grub	Grubs of these beetles damage the roots.
Stalk-borers	The caterpillar causes "dead hearts."
Paddy grasshopper	Damages the leaves.
Mite	Damages the leaves.

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Transland Swathmaster All-Purpose Applicator

TRANSLAND Aircraft, Torrance, Calif., has announced that a new, all-purpose Swathmaster for aerial application of pesticides, fertilizers, seeds, etc., to farm, range, and forest lands is in full production. The units will be available from the Transland manufacturing facility at Torrance Municipal Airport early this month.

The new aerial dispersing unit will permit a single airplane to dust, spray, seed, or fertilize. The plane can change from job to job by means of a simple resetting of controls by the pilot and with no applying time lost for equipment change-over.

In addition, the Swathmaster will dispense dry or liquid materials at any swath width. A minimum of 33 feet and a maximum of 100 feet have proven successful in tests at Torrance. Seed and fertilizer operators have reported double coverage at 48 feet.

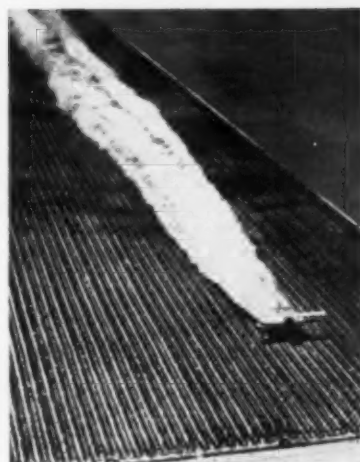
This new dispensing unit permits an airplane to dust, spray, seed, or fer-

tilize without any aerial applying time lost for equipment change.

Flow rates are limited only by the density of dry materials or the viscosity of liquid materials. For example, a Swathmaster equipped airplane can spray a full and uniform swath at one gallon per acre and, on the next swath, spray at 180 gallons per acre.

Basically, the Swathmaster is a stainless steel, corrosion-resistant, airfoil-shaped assembly comprised of two outer panels, a center section that acts as a mixing chamber, and an agitator box. The agitator, containing a conventional wind driven propeller, agitator, and patented gate, attaches to the throat of a conventional hopper in the fuselage. The single gate for dry and liquid materials is operated by conventional pilot controls.

The front of the Swathmaster contains a large air intake which draws in 110 cubic feet of ram air per second. The airfoil-shaped structure is perforated on the top surface



The swath width is limited only by the amount of foliage on the crop.

through which dust and liquid materials are distributed evenly into the air stream. The under surfaces have louvers through which seed and pellets are discharged.

The original Swathmaster was developed in 1951 by Joe Sellers, general manager of Atwood Crop Dusters, a California concern. The present all-purpose, simple configuration was attained early in 1957 and limited manufacturing production followed. Its acceptance by agricultural operators is said to have been the basis for Mr. Sellers' decision to place the Swathmaster in full production at Transland.

The Swathmaster is designed for the Stearman PT-17 airplane and is structurally stressed for aircraft whose speeds do not normally exceed 150 mph. Its effectiveness is being considered for other aerial applying aircraft such as the Transland AG-2, Grumman Ag-Cat, Fletcher FU-24, Call-Air A-5 and A-6, Clark, Rowden, and Snow S-2.

The Swathmaster has no moving parts except the flow regulator, gate, and agitator.

Comprehensive flight tests and reports from users, indicate that the Swathmaster has no adverse effect on the airplane in flight and can easily and consistently lay a standard swath at normal applying speeds. In emergencies, a full load can be dumped from the hopper in three to five seconds.★★



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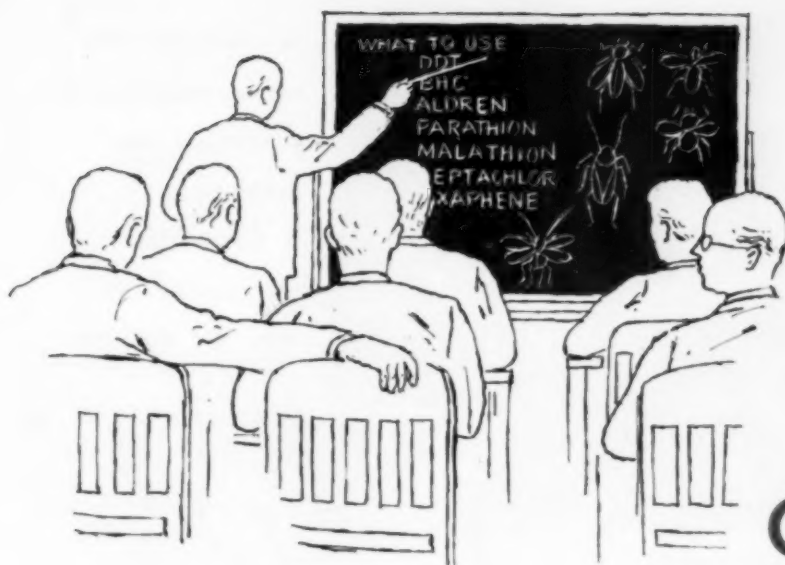
Co-RAL is of particular importance to cattlemen seeking an effective and practical way to control grubs because:

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Illinois Spray Operators

GO BACK TO SCHOOL

*By Patricia Close**

MOST people, when they graduate from high school or college, toss their books aside and forget about studying again. But not so with Illinois custom spray operators. Every year several hundred of them return to the University of Illinois campus for the Illinois Custom Spray Operators' Training School.

Spray operators agree that good topics and good speakers are two of the "ingredients" that help make the spray school a success. They also highly rate the summary of presentations, and the fact that the school is run on schedule.

January, 1949, was the date of the first Illinois spray school. It was held to meet the needs and help solve problems of the growing custom spray trade within the state.

Custom spray operating did not become important in Illinois until 1945 when DDT was first released for public use. After that, custom

spray operators became more and more numerous. Many problems confronted these people. One of the biggest was the lack of a reliable source of information about sprays and chemicals. People interested in spray operating lacked knowledge necessary to the trade. And entomologists had no direct contact with the operators.

H. B. Petty, extension entomologist with the University of Illinois and the Illinois Natural History Survey, was aware of these problems. He consulted agronomists and pathologists as to what they could do. The answer was the establishment of the Illinois Custom Spray Operators Training School. Dr. Petty organized the first school and has since been chairman of every school.

The spray school is a two-day short course held in January each year on the University campus. Although the school is primarily for custom spray operators, many other interested persons attend.

Spray operators at the school

learn about new sprays and chemicals, new methods in insect and weed control and to improve the effectiveness of spraying. This is important because of all the agricultural chemical sprays applied in the state, at least 50 per cent are applied by spray operators who attend the school.

In order to promote the first school in 1949, announcements were sent to all farm advisers. These advisers gave Dr. Perry the names of spray operators in their counties, and also urged the operators to attend the school. Dr. Perry, in turn, sent announcements to the operators. Notices also went to other people interested in the agricultural chemical trade. And newspapers and farm radio programs helped with promotion.

Attendance at the first school totaled 350. During the next few years, attendance declined, but began rising again in 1953. Attendance reached an alltime high this year when

(Continued on Page 89)

*Patricia Close is an editorial assistant on the University of Illinois College of Agriculture editorial staff.



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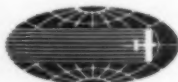


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AGRICULTURAL CHEMICALS



B. L. Hinman, who operates the fertilizer service, is shown in the helmet at the right of the picture.



Mr. Hinman lands on the road beside his loading equipment. To save time, the plane is reloaded at the site of the field being sprayed. The plane is a 135-HP Cub with a custom-built spreader.

AERIAL application of granulated ammonium nitrate fertilizer still ranks well behind the application of herbicides and insecticides in the volume of business handled by B. L. Hinman, Plains, Kans., aerial applicator, but he believes that the next ten years will see a tremendous increase in aerial fertilizer application in his area.

Mr. Hinman operates in far Southwest Kansas which produces a lot of dry land wheat and more and more wheat under irrigation. The use of ammonium nitrate fertilizer on wheat is common in that area but aerial application is relatively new.

Mr. Hinman started the service in 1955 but hasn't had a really big year of fertilizer application until this year, when, for the first time since he offered the service, prospects are good for a bumper wheat crop.

Recently Mr. Hinman was publicized as having the only equipment

in the state of Kansas suitable for the aerial application of fertilizer. At an aerial applicators' meeting in Liberal, Kans., a few days after this publicity, several operators disputed this statement, but soon found that Mr. Hinman was right.

Mr. Hinman operates the fertilizer service with a 135-HP Cub. He says most combination type bins are adequate, but that fertilizer requires a much larger spreader than common factory equipment to apply sufficient quantity.

Dust type venturi are not adequate and don't scatter enough, Mr. Hinman said.

The common type of factory-installation spreader can apply only 50-pounds maximum to the acre over the 27-foot average swath width covered by Mr. Hinman.

His custom-built spreader can apply up to 300 pounds to the acre

(Continued on Page 87)

Fertilizing Kansas Grain By Aircraft

by Joe Cannon
Southwest Daily Times
Liberal, Kansas

PEST ROUNDUP

This column, reviewing current insect control programs, is a regular feature of **AGRICULTURAL CHEMICALS**. Mr. Dorward is head—Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By *Kelvin Dorward*



Grasshoppers Severe in Several Areas

THE grasshopper problem had by June 11, reached outbreak proportions on 11 million acres in Colorado, Kansas, New Mexico, Oklahoma and Texas. Cooperative programs between the Federal Government, the States, Counties, ranchers and farmers involved, were being organized to combat the pest on rangeland, wasteland, idle land and roadsides in various areas. Farmers in all cases were to treat their own croplands.

In Texas more than 4 million acres of range, idle and waste land in 15 counties were affected. As of the above date, control work had been organized in Dallam, Hansford, Hartley, Hutchinson, Moore, Ochiltree and Sherman Counties, with other Counties to be organized as soon as possible. Limited damage to the borders of wheat fields had occurred, but due to the nearness of harvest serious loss was not expected. It was anticipated that about 900,000 acres of range and idle land will receive treatment in the Texas panhandle.

Oklahoma reported grasshoppers abundant on more than 1 million acres of range, idle, and waste land in Beaver, Cimarron, Ellis, Harper, Roger Mills and Texas Counties. Cooperative treatment programs were developed for 120,000 acres in Cimarron and Texas Counties.

In Colorado severe grasshopper conditions were reported from Cheyenne, Kiowa, Kit Carson, Prowers, Yuma and Washington Counties. Counts ranged up to 400 per square yard with some grasshoppers in the adult stage by June 11. Less serious but important infestations were pres-

ent in 10 other Colorado Counties. Over 300,000 acres of rangeland were scheduled for treatment under the Federal-State-rancher cooperative program.

The main infestation in Kansas involved an area about $3\frac{1}{2}$ counties wide running from north to south in the western part of the State. Little crop damage had been reported, with the infestation still confined largely to roadsides, idle and waste land. As of June 11, plans had been completed to treat 125,000 acres of roadsides and idle land in 17 counties. It was expected 9 other counties would enter the program. The New Mexico program involved about 160,000 acres, with only Union County being involved in early June.

In North Dakota the populations were spotty, with threatening to severe records in Stark, Golden Valley, Billings and McKenzie Counties. Some damage was occurring to small grains, but controls were being applied.

During late May heavy populations of grasshoppers were reported on rangeland in Cuyama Valley, Santa Barbara County, California. First- and second-instar nymphs averaged 70 per square yard in the Beale Air Force Base area of Yuba, Nevada and Placer Counties, while heavy populations were also reported from range grass in the Plymouth area of Amador County and at Ukiah, Mendocino County.

In late April the banded wing grasshopper *Trimerotropis pallidipennis* developed in outbreak numbers on large acreages of desert range adjacent to croplands in Pinal and Mari-

copa Counties, Arizona. Nymphal and adult migrations began when desert grasses dried with advent of warm weather. Damage was especially severe in the Maricopa-Casa Grande-Coolidge area, particularly to sprouting cotton in the immediate paths of migrating bands of nymphs. This same species was heavy in parts of Utah, Nevada and reported from areas of New Mexico.

Other Cereal and Forage Pests

By early June pupation of the European corn borer was complete in the southern and central area of Missouri. Egg laying was underway in the southeast area, with 12-16 masses per 100 plants, but few corn fields were advanced enough to offer good egg laying conditions. The first moth at Ankeny, Iowa was taken May 22 and by early June pupation was 90 to 100 percent complete in the central third of the State. Moth flights were on the increase. Although the overwintering populations were low in Illinois, with corn generally ahead of normal, survival could be high with damage heavier than last year. By early June pupation was 40 percent in south central and southwestern Minnesota and 80 percent in one Sauk County, Wisconsin light soil area which later on would be heavy soil. In Wisconsin it did not appear that the first brood would be very well synchronized with corn growth. As of the first week in June there was approximately 62 percent pupation in east central South Dakota. In southern Sussex County, Delaware, egg masses were fairly common on small sweet corn plants. By the last week in May mortality was

(Continued on Page 50)

Custom Applicator the "Patsy" in Spray Damage Actions

BOB Danforth, operator of Danforth Aerial Sprayers, Monmouth, Ill., comments on the unhappy role of the custom applicator in being forced to defend himself periodically against unjustified claims for damage resulting from his operations. He is currently involved as defendant in an action for \$15,000 damages being brought by an Illinois farmer. The case will be heard in McDonough County Circuit Court, Macomb, Illinois in October, 1958. Mr. Danforth's letter follows:

Your first issue of "The Custom Applicator" is excellent, — just what I had in mind. I am much interested in the New York DDT trial, because of a suit in which I am involved here in Illinois. Following is a brief summary of the case, which may be of interest to applicator readers. It illustrates what flimsy evidence suffices to get a case before a jury, making it necessary for the applicator to spend hundreds and perhaps thousands of dollars to defend himself.

On July 1, 1957, I applied 16 to 20 pounds of 5% DDT by airplane on a field of corn for Ross McGrew at Industry, Illinois. The material was formulated by Stauffer Chemical Co. Temperature at the time of application was eighty seven degrees, sky was clear, with a south wind of four miles an hour. Mr. McGrew bought the DDT from a dealer and I applied it as per his directions.

A neighbor, Carl Provine, had a pasture directly to the south of the corn field. Mr. Provine contacted me on August 16th claiming considerable damage. Some of the initial claims were, "nineteen head of dairy cattle seriously sick from DDT poison, hickory trees dying in pasture, DDT still all over the ground six weeks after application, milk production fallen from \$90.00 to \$30.00 per week, children ill from consuming milk and cream."

A law suit was filed December 13, 1957 alleging, "\$200. loss per dairy animal, loss of \$90. per week for 20 weeks of milk check because of seizure of milk by Illinois Division of Dairies, ill health of daughters which is expected to linger for a year and damage to his pasture." The suit claimed damages of \$15,000.

Investigation disclosed the following facts. Doctors who treated the children were inclined to think the illness could have been caused by many factors other than DDT. They would not, when interviewed testify the illness was DDT poisoning.

The veterinarian stated the cows were sick and showed signs of poisoning. After

being told of the DDT in the adjoining corn field he assumed it was DDT which was causing the trouble. A milk sample was taken August 24, 1957 by the Illinois Division of Dairies and milk was said to be contaminated, but they did not state by what foreign substance. On August 29th a sample of milk was tested at the University of Illinois from the Provine herd and found to contain no DDT. Cheese from which this milk was made was seized (30,000 pounds) in Curwensville, Pa., tested for contamination and

released for consumption. These shipments were made into cheese during the last week of July and August 6, 1957. Provine's milk was used as a starter in all this cheese. The liver of a slaughtered animal showed lesions of arsenic.

University tests during 1957, feeding dairy animals up to 200 parts per million of DDT in their forage, disclosed no such ill effects as have shown up in the Provine herd. A twenty pound application of DDT (5%) would amount to about 100 P.P.M. on the corn, and obviously only a much smaller amount could possibly have drifted onto the pasture. Mr. Mc-

(Continued on Page 89)

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PEST ROUNDUP

(From Page 48)

27 percent in 89 fields inspected in 12 New Jersey counties, with 1.29 borers per stalk. The larval population was less than in 1956 and 1957 and outlook for first-brood generation was not high except in the Monmouth County, area. In Alabama all overwintering larvae had pupated and in Indiana no living larvae were found in inspections in 7 counties.

In Utah the Say stink bug developed into outbreak proportions by late May and was continuing active in early June. Heavy populations in grain were recorded from Juab, Millard, Washington, Iron, Garfield, Uintah and Utah Counties. The outbreak was considered the worst since 1952 and treatment was necessary on several thousand acres of crops. Arizona reported the insect as being heavy on barley and oats in Graham and Pinal Counties and on oats in Pima County.

Leafhopper Movement Heavy

The long distance spring movement of the beet leafhopper to the Utah, Nevada and Colorado districts growing sugar beets and tomatoes began May 6 and reached a peak by May 18. From May 21 to 30 another movement occurred which increased the population to 4.7 insects per square foot of beet row. The population in early June was higher than any year since 1926 and damage to non-resistant sugar beets and tomatoes is expected to be serious. In Idaho large migrations of the beet leafhopper appeared in the south central area, evidently borne by southerly winds. In the western end of the Twin Falls irrigated tract populations averaged slightly over 13 per square foot.

The Colorado potato beetle was reported during the period in varying numbers from several States. Pennsylvania, Delaware, Maryland, Virginia, North Carolina, Georgia, Alabama, Louisiana, Colorado, Idaho and Washington, all reported the insect as being rather active. The flea beetle was another vegetable insect

AGRICULTURAL CHEMICALS

with heavy populations in several States. Rhode Island, New Jersey, Virginia, West Virginia, North Carolina, Wisconsin, Utah and Idaho were among the States reporting heavy or damaging populations.★

Aerial Spray Problems Told

Ivor Burden, president of the Western Agricultural Chemicals Association and a vice president of United-Heckathorn Co., Richmond, Calif., spoke at the annual meeting of the Association of County Agricultural Commissioners, June 2 to 5, at Hobergs, California.

Mr. Burden told of some of the problems concerning large aerial spray contracts and said that the trend is toward the use of larger aircraft for such contracts. For smaller pest control jobs, he said, the trend is toward the use of "convertible" type ships. Mr. Burden said, also, that there will be more consolidation of chemical and flight companies in the future.

The agricultural commissioners' Pest Control Committee discussed a proposal for legislation that would require persons making pest control recommendations to be licensed. The legislation was proposed by the Agricultural Aircraft Association of Fresno, Calif. Robert Z. Rollins, chief of the California Bureau of Chemistry, attended the meeting and listed some of the problems to be solved before this legislation can be submitted. Mr. Rollins mentioned such points as who is to be licensed, who is to issue the license, and who is to police it. He said that an examination to be taken by applicants would have to be set up.

The Pest Control Committee decided at the meeting that the proposed license should not be too hard to obtain nor too technical. They recommended that it cover only those persons making pest control recommendations in the field on crops to be used as food or feed. The committee asked the Agricultural Aircraft Association for case histories to substantiate the need for the recommended licensing.

Arthur W. Worledge was elected president of the Agricultural Commissioners Association at the meeting.

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"With malathion, we've had better weevil kills than ever before!"

JOE CORPORA operates an aerial dusting service out of Hearne, Texas. Because resistant weevils were established in Joe's area by 1957, he started adding malathion to his mixtures. After a season's use, he reports: "With malathion we had better, faster kills than we ever had before . . . with *any* insecticide. We had planters who just were not getting control with chlorinated hydrocarbons. Yet two applications of malathion knocked 80% infestations down below 20%. And, malathion *kept* them down."

Safety in Use

Joe Corpora is typical of the many crop dusters and planters who switched to malathion because they *had* to control resistant weevils and wanted to use an insecticide that offered safety in use. (The USDA calls malathion "one of the safest insecticides to handle"). Malathion's performance far exceeded



Joe Corpora keeps up with current crop practices, weather patterns and the latest developments in the insecticide field in order to give his customers the best possible service. That's why he switched to malathion in 1957.

expectations. It gave faster, higher kills of weevils . . . whether or not resistant . . . than *any* insecticide ever had before.

Many of Joe's customers reported going into the rows soon after application and finding the infestation already under control with most of the weevils dead and the rest dying. And Joe says, "Many planters were able to widen intervals between applications . . . effecting savings of time and money . . . while still keeping infestations well below the danger point."

Malathion prevents build up

O. M. Lightsey, Byran, Texas, reports that malathion re-established control on 175 acres where weevils were walking through chlorinated insecticides. On other acreage,

where malathion was used right through the season, weevils never built up at all.

He says, "We had better weevil control this year than *ever* before."

As for safety, Mr. Lightsey stated, "Safety always has a lot to do with our selection of an insecticide. We use ground equipment whenever possible. For one reason or another we are in the fields every day. We never have to worry about taking chances with our help when we use malathion."

Malathion dusts or sprays, alone or in combination with other insecticides, are available under the brand names of many well-known manufacturers. Your dealer can offer you a choice and supply you with informative literature.



"Hard-to-kill" or "resistant" boll weevils are becoming a real problem in many sections of the cotton belt. Malathion gives excellent control, also stops aphids, mites, leafworms (including brown leafworms) and perforators.

LISTENING POST

By Paul Miller



This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Control of Crown Gall of Mazzard Cherry with Antibiotics

IRA W. DEEP, of the Oregon Agricultural Experiment Station, reports results of experiments to reduce the amount of crown gall (*Agrobacterium tumefaciens*) on Mazzard cherry seedlings by pre-planting root treatment with certain antibiotics that have been reported to possess bactericidal and chemotherapeutic properties. The antibiotics tested were streptomycin sulfate, Agri-mycin (15% streptomycin and 1.5% oxytetracycline), and Terramycin (oxytetracycline). Semesan Bel (hydroxymercurinitrophenol; hydroxymercurichlorophenol) was used as a standard.

The tests were made in 1954 and 1955. Root-pruned Mazzard cherry seedling trees were inoculated with a suspension of the crown gall bacterium prepared from a culture isolated originally from Mazzard cherry. After drying for 1 hour the roots were immersed for specified time periods in the various antibiotic preparations. For each treatment 100 seedling trees were used, planted in four randomized blocks of 25 trees each. Six months later the trees were dug and examined for galls.

There were two sets of untreated controls. In one set, the trees were inoculated with the bacterium, in the other set the trees were not inoculated. The uninoculated controls were included to determine the percentage of trees with incipient infection but without symptoms at the time of treat-

ment. Chemotherapeutic activity of a treatment is indicated by reduction in incidence of gall below the level of incipient infection shown by the percentage of crown gall developing in the uninoculated control trees.

Dosages, in ppm of active ingredient, and treatment times are listed in the Tables.

1954 Results: Table 1 reports results for 1954. Most significant was the consistent decrease in gall incidence with increase in length of treatment. Agri-mycin 400 ppm for 1 hour gave greatest reduction in per-

centage of crown gall but the difference between it and Semesan Bel was not significant. Agri-mycin 400 ppm for 1 hour was the only treatment that decreased crown gall significantly as compared with the uninoculated control.

Streptomycin sulfate and Agri-mycin at 400 ppm for 1 hour were somewhat phytotoxic but did not reduce stands significantly.

1955 Results: Table 2 shows that Terramycin was superior to either Agri-mycin or streptomycin sulfate. Both Agri-mycin and streptomycin sulfate at 200 or 400 ppm for 1, 2, or 3 hours gave significant reduction, but at 400 ppm for longer than 1 hour they were phytotoxic. Agri-mycin was better than streptomycin sulfate. Agri-mycin at 400 ppm for

Table 1. The effect of dosage and duration of treatment with three antibiotics on incidence of crown gall of Mazzard cherry trees (1954 Experiment).

Chemical	Dosage PPM	Percentage gall following a treatment for		
		1 min.	15 min.	1 hour
Streptomycin sulfate	100	26.6	21.5	16.6 ^a
	200	26.1	23.9	20.4
	400	25.0	13.6 ^a	8.9 ^a
Agri-mycin	100	23.3	19.7	13.4 ^a
	200	35.5	21.7	11.3 ^a
	400	32.2	26.6	5.1 ^{a,b}
Terramycin	100	22.0		
	200	34.8		
	400	18.7		
Semesan Bel	1928	11.9 ^a		
Inoculated control		32.5		
Uninoculated control		20.2		

^aIra W. Deep, "Reduction in incidence of crown gall of Mazzard cherry following antibiotic treatments," *Plant Disease Reporter*, vol. 42, no. 4, pages 476-480, Apr. 16, 1958.

^aSignificantly different from the inoculated control at the 5 percent level.

^bSignificantly different from the uninoculated control at the 5 percent level.

1 hour gave better results than Semesan Bel and was not injurious.

From the standpoint of both control and lack of phytotoxicity the best

Terramycin treatments were 200 ppm for 1 hour or 400 ppm for 15 minutes.

Incidence of crown gall in these two treatments was 41 and 49.5 per cent,

respectively. The effectiveness of these treatments may be obscured by this 40 to 50 per cent infection. The inoculum used in 1955 was very infective, that is the inoculum potential was very high, as shown by 99 per cent infection of inoculated control plants and 80 per cent of the plants treated with Semesan Bel.

The contrast between the 1954 and 1955 tests in results from the Agri-mycin 400 ppm treatment for 1 hour demonstrates the influence of the high inoculum potential in the latter year. In 1954, the amount of infection was 5.1 per cent in the treatment and 32.5 per cent in the inoculated controls. In 1955, the same treatment gave 72.9 per cent infection as compared with 99 per cent in the inoculated control plants.

No evidence of chemotherapeutic activity was obtained in 1955. There was less infection than in 1954, and since the inoculum potential was so high as to prevent complete surface disinfection, it was not possible to detect whether any internal action by any of the chemicals took place.

Discussion: As compared with a standard Semesan Bel treatment, Terramycin at 400 ppm for 15 minutes or 200 ppm for 1 hour was much more effective in controlling crown gall and was not injurious. Experiments are being conducted in co-operation with Oregon nurserymen to determine effectiveness and safety under field conditions.

Agri-mycin 400 ppm for 1 hour eliminated some incipient infections in one trial, and Terramycin in greenhouse tests showed similar activity. This is an important factor in controlling crown gall of Mazzard cherry seedlings, since incipient infections may lead to heavy losses of nursery stock budded or grafted on the seedlings. From 6 to 26 per cent of incipient infection occurred in the trials reported.

Losses from crown gall reported by Oregon nurserymen are frequently more than \$1000 an acre. The results of these experiments indicate that although Terramycin will not give complete control, its use will greatly reduce the amount of crown gall.★★

Table 2. A comparison of the effectiveness of pre-planting treatments with streptomycin sulfate, Agri-mycin, and Terramycin in preventing crown gall (1955 Experiment).

Dosage PPM	Treatment Time	Total percentage gall following treatment with		
		Streptomycin	Agri-mycin	Terramycin
100	1 min.	—	—	94.9
	15 min.	94.3	98.9	81.3
	1 hour	95.4	94.4	77.9
	2 hours	80.7	95.7	68.3
	3 hours	89.3	92.9	68.2
200	1 min.	—	—	92.7
	15 min.	97.8	94.7	66.3
	1 hour	93.5	90.7	41.0
	2 hours	74.0	93.2	33.8
	3 hours	86.6	85.6	25.0
400	1 min.	—	—	68.8
	15 min.	82.8	89.5	49.5
	1 hour	82.2	72.9	10.3
	2 hours	85.5	76.6	12.7
	3 hours	62.3	54.2	14.9
Inoculated control		99.0		
Uninoculated control		9.2		
L.S.D. 5% level 3.36				
L.S.D. 1% level 5.86				

Table 3. The effect of Terramycin treatments on the incidence of crown gall of Mazzard cherry trees (1955 Experiment).

Chemical	Dosage PPM	Percentage gall following treatment for				
		1 min.	15 min.	1 hr.	2 hr.	3 hr.
Terramycin	200	92.7	66.3	41.0	33.8	25.0
	400	68.8	49.5	10.3	12.7	14.9
Semesan Bel	1928	80.2				
Inoculated control		99.0				
Uninoculated control		9.2				
L.S.D. 5% level 3.36						
L.S.D. 1% level 5.86						

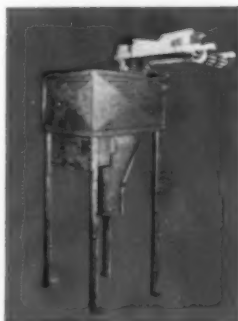
Table 4. The effect of Terramycin treatments on stand of Mazzard cherry trees (1955 Experiment).

Chemical	Dosage PPM	Total stand from 100 trees treated				
		1 min.	15 min.	1 hr.	2 hr.	3 hr.
Terramycin	100	99	91	87	82	89
	200	96	89	85	80	72
	400	96	93	76	63	72
Semesan Bel	1928	96				
Inoculated control		98 and 91				
Uninoculated control		99 and 89				
L.S.D. 5% level 3.13						
L.S.D. 1% level 4.13						

We believe that an intelligent reappraisal
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may reveal opportunities
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of dollars annually.

Be Penny Wise!

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AC

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Ammonia plant start-up operations are virtually a matter of "push-button" routine with Chemico; for Chemico has designed and constructed more than 50 ammonia plants in the last 40 years.

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Demonstration Plots
Group Meetings
County Agent Programs
Mass Media
Field Days

MAKE OKLAHOMA FARMERS

FERTILIZER CONSCIOUS

A NETWORK of demonstration plots, supported by field days, group meetings, county agent programs and mass media, are making Oklahoma farmers fertilizer conscious!

Much of the program in the Sooner state revolves around extension agronomist Gaylord Hanes who has plastered the state with a web-work of fertilizer demonstrations, and has seen to it that radio, television, newspapers, farm magazines and journals help tell the story to the largest possible audience.

Here is a capsule summary of his mass media efforts last year:

- 700 news stories (counting his own and those he inspired agents and others to write).
- 2,100 separate radio programs (this includes fertilizer programs taped by county agents, as well as tapes done by Hanes for multiple use on a network of Oklahoma stations).
- 400 form letters sent to farmers and groups by agents and Hanes.
- 11,000 visitors at the various fertilizer field days held during the year.
- 40 television programs (again counting multiple use programs which sometimes multiply a single program eight or nine times when used by that many TV stations).

He averages three magazine stories a year in one of the major farm publications covering Oklahoma, and usually has about two stories a year in trade journals. He recognizes the tremendous impact of mass media, and credits their help with much of what he has been able to accomplish.

Hanes came to the state Extension office in 1952 from a county post,

and immediately launched out on a fertilizer demonstration program which reached 40 counties with 160 plots that first year.

In 1953, he had established a little over 200 demonstration plots in 50 counties, and each year since then he has had 350 demonstrations in 75 counties . . . all except two in the state. All major cash crops and improved pastures are included in the demonstrations.

Hanes says 250 of these locations are package demonstrations where all recommended varieties of the area are grown, cultural practices are demonstrated, and varying amounts of fertilizer are used. One plot will receive no fertilizer at all, another gets fertilizer at the recommended rate, another will receive only half the recommended rate, and still another will get twice the amount of fertilizer recommended. One-half of each plot is top-dressed with nitrogen. This gives the crowds which attend field days or visit the plots in small groups a lot of information.

"We try to establish our demonstrations on highways or farm-to-market roads, erect signs and also place stakes giving plot treatments," Hanes said. "We also try to get out local publicity on the location of the plots and encourage people to come out and see them."

Field meetings are held at demonstration areas just prior to harvest to discuss research results that apply to the area, demonstration results, and

proper fertilizer placement. We display improved fertilizer application machinery and hold yield-guessing contests, with local dealers supplying prizes. Harvest plots and results are used on a local basis as a means of extending the life of the demonstrations.

Hanes also takes many pictures and color slides of his demonstration plots to use in publicity, educational meetings and TV shows.

About 150 educational meetings are held each year on the demonstration work, with Hanes making part of them and the county agents taking care of others. He estimates about 6,000 people annually attend these meetings.

A recent innovation which has been found most beneficial is small group meetings of county agents, usually three or four counties at a time being involved, where the Extension agents and Hanes can talk over plant nutrition and soil fertility, and plan ways to do a better job of demonstrating the value of fertilizer to the farmer. He will soon complete a schedule which will have brought agents from all 77 counties into one of these small group meetings.

With the Plant Food Educational Society providing prizes, the OSU agronomist has developed a demonstration program with 4-H Club and FFA members. Each participant grows five acres of wheat, with one acre

(Continued on Page 89)



On this scale, the tank car that brings your order of SPENSOL GREEN is weighed twice: (1) before shipment to make sure it contains the full amount you ordered; (2) upon return to make sure it is completely empty.

Here's How Spencer Makes Sure You Pay Only For The SPENSOL® GREEN You Receive

(TRADEMARK)

Weighing tank cars before and after shipment provides an exact, accurate record of the amount of SPENSOL GREEN delivered to you!



This scale is not only balanced at the start of the day's work, it is also rebalanced as many times each day as necessary to compensate for temperature or weather changes.

To make certain you get all of the SPENSOL GREEN you order, and that you pay only for the SPENSOL GREEN you actually unload, Spencer has a rigid control system that involves three different weighing processes.

First, the solution is carefully weighed in the batching tank where it has been blended to your particular "recipe."

Then, after your solution is loaded into its tank car for shipment, it is weighed on a special track scale by a Bonded Weighmaster.

Last of all, after you have unloaded your shipment of SPENSOL

GREEN, the tank car is weighed once again when it is returned to the Spencer nitrogen plant.

If the car is not completely empty, you are given a refund for the amount of SPENSOL GREEN remaining in the car.

Careful control like this is just one of the many reasons why so many mixers today are switching to Spencer Nitrogen Solutions.

Before you place your next order for nitrogen solutions, consider how much more you get when Spencer is your supplier. Switch to SPENSOL GREEN and see for yourself!



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SPENCER CHEMICAL CO., Dwight Bldg., Kansas City 5, Mo.; District Sales Offices: Atlanta, Ga.; Chicago, Ill.; Memphis, Tenn.; Kansas City, Mo.; Works: Pittsburg, Kans.; Chicago, Ill.; Henderson, Ky.; Vicksburg, Miss.; Orange, Tex.

Insist on SPENSOL GREEN (Spencer Nitrogen Solutions)

WASHINGTON REPORT

By Donald Lerch



THE question of how much farmers know about agricultural chemicals has been bothering Industry leaders. The thinking is that once you have a record of how much farmers know, you can gear information programs to boost their knowledge and their use of fertilizers and pesticides.

As is well known by now, the survey sponsored by the National Plant Food Institute has shed some highly interesting light on what farmers do and do not know. A surprising percentage of farmers apparently do not know all they should about fertilizers, or how, when, or why to apply them.

Feeling the same situation applies to pesticides, the National Agricultural Chemicals Association is trying to solve the problem of how to get more information to farmers in usable form. The opening move in this search is a recently completed analysis of how information flows from research centers to practical farmers.

The analysis shows five categories of information sources, with hundreds of individual units in each category. All try to push information along with their own interpretations and at their own language levels.

While no conclusions are presented from the NAC study, it does suggest a field for study by everyone who wants to get information about his products to potential buyers quickly and accurately. For example, the study shows that information flows directly from research laboratories to the general public. Everyone knows this can be a most effective path for communication if the information is in language the practical farmer can understand. If the information is

written for other scientists, however, the result might be complete confusion for the average farmer.

Over-all the NAC study indicates that from the practical farmer's point of view the onrush of words about agricultural chemicals presents a bewildering picture. From the multitude of sources of information available he must select the few he can understand and trust. For many farmers this turns out to be his more advanced neighbors and friends who have digested the information from the higher sources.

Communications in agriculture are more complex than it appears on the surface. Studies underway offer promise of many improvements in speeding practical information to the men on the farm who buy and use Industry products.

* * * * *

NAC has put together a 25th Anniversary program directed toward future opportunities. Instead of dwelling on advances of the past, the emphasis will be on public relations and new markets for future growth.

Senator Herman E. Talmadge of Georgia, who started life as a farm boy, will be one of the featured speakers. This is appropriate since the NAC Anniversary meeting will be held in one of Senator Talmadge's most famous cities — Augusta, Georgia, October 29-31.

Leading Industry speakers will be Frank Washburn, general manager, Agricultural Division, American Cyanamid Company; John Gillis, vice president, Monsanto Chemical Company; and, of course, Jackson V. Vernon, vice president of Food Machinery and Chemical Corporation, and president of NAC.

Public relations and marketing, both highly complex subjects today, will be discussed by panels of experts. Those on the public relations panel will include Charles Maddock, general counsel, Hercules Powder Company, the Hon. Phillip Alampi, New Jersey Secretary of Agriculture, Dr. Cynthia Westcott, the "Plant Doctor," Stephen G. Pugh of the Southern Bell Telephone Company, and a member of the NAC staff.

The new markets panel is set to cover potential new sales in highway roadside maintenance, forestry, agriculture, and exports abroad. Panelists will include M. W. Melander, manager, Export Division, Stauffer Chemical Company, Wilbur J. Garmhausen of the Ohio State Highway Department, and Dr. Herbert L. Haller, of the USDA.

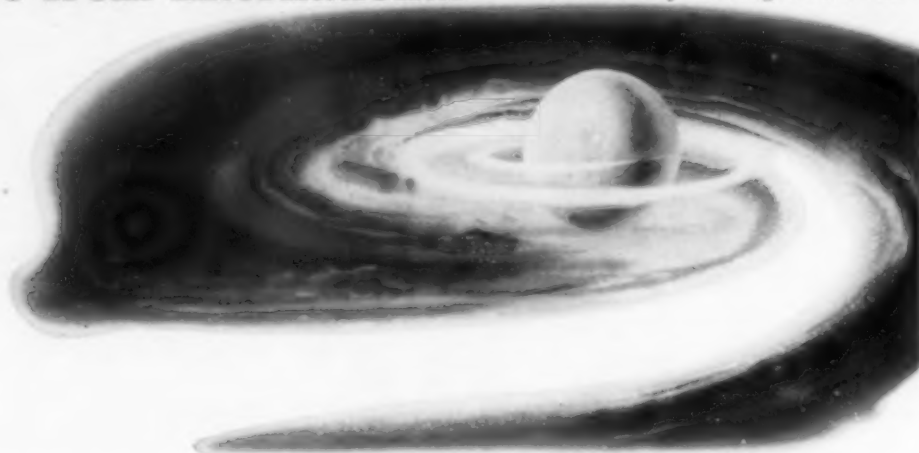
NAC's 25 years of history will be covered very cleverly in a fashion show featuring the wives of former NAC presidents in the costumes of the period when their husbands served, followed by a showing of the most modern fashions by a local fashion store.

* * * * *

Government reports that fertilizer and pesticide supplies will be adequate to meet all domestic agricultural requirements again this year. While not saying it in so many words, the reports bring out again the fact that the Industry's ability to produce is still considerably greater than agriculture's ability to consume.

The search is on not merely to increase farm consumption, but to develop new off-farm markets. Off-farm uses are where the greatest increases in sales can be expected in coming years, according to "The

Exclusive from International — “Creators of Living Minerals”



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concept of full range
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fertilizer profitably**

FULL ORBIT SERVICE... a dynamic, new concept of buyer-supplier teamwork, exclusively yours from International Minerals. It's geared and powered to help you sell more goods at less cost, with greater profit. FULL ORBIT SERVICE puts the entire International Minerals organization to work for you... welds every "look-ahead" and promotional resource into a result-getting business force. Your International representative will help you build your plans for a successful year around FULL ORBIT SERVICE. Ask to see it right away so you can use it in planning your next season's program.

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for down-to-earth results*

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INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center — Skokie, Illinois



Fertilizer Situation For 1957-58." Most promising markets are listed as forest lands, highway roadsides, home gardens, cemeteries, and recreation facilities. These same markets are being developed for greater pesticide sales.

* * * * *

Another market with a growing future potential is foreign sales. Exports of pesticides have been climbing steadily, but the need for both fertilizers and pesticides in many foreign countries is fantastic.

Raymond Ioanes, acting administrator of USDA's Foreign Agriculture Service, just back from a tour of 11 countries in Europe, the Near and Middle East, and the Far East, indirectly pointed up the tremendous opportunity to improve agriculture abroad. He emphasized that the U. S. is the biggest exporter of farm products today. One out of every five U. S. acres produced for export last year. This is equal to the production of 60 million acres.

The reason is that agriculture in many foreign countries is so far behind the U. S. that farmers cannot even feed local populations and the countries have to import U. S. foods. Excessive hand labor and exceptionally low yields are the main reasons. As in the U. S. wider use of fertilizers and pesticides abroad could cut much hand labor and skyrocket yields.

Some politically-minded agriculturists here feel very strongly that such improvements in agriculture abroad would do as much as anything else to stabilize foreign economies and strengthen the free world.

* * * * *

We have learned that the Federal-State aerial spraying of several hundred thousand acres of forest land in Pennsylvania for gypsy moth control this summer was completed without any of the public furor that accompanied the New York spraying last year. Aside from a sprinkling of letters from isolated organic farmers, there was no objection to the spraying.

This bears out all earlier experience in Pennsylvania where citizens welcome aerial spraying for its ef-

fectiveness in wiping out pesky houseflies and mosquitoes as well as the gypsy moth.

Perhaps the difference is that people in northeastern Pennsylvania know where their food and fiber come from and realize that it has to be protected from the threat of insect and other pest destruction. The same seems to be true of five Western states which have asked the Federal Government for aid in combating one of the most serious grasshopper threats in recent years.

* * * * *

As nearly everyone predicted, the Magnuson Bill has found easy sledding in Congress. The Bill which would authorize additional funds to study the effect of pesticides on wildlife has passed the Senate. All indications are that it will pass the House and be signed by the President during this session of Congress.

Reason for the easy passage of this Bill is that it has had the support of NAC as well as of wildlife groups, such as the Audubon Society, the National Wildlife Federation, and others. All more or less agree that continuing studies will provide added information to assure that forests, croplands and marshes can be sprayed or dusted with minimum losses of fish and wildlife.

What is not yet known is how extensive the expanded research programs will be in this field or when they will begin. The Magnuson Bill provides no funds for the research. It merely authorizes the interested agencies—the U.S. Fish and Wildlife Service and the USDA—to request additional funds for this research. How much they request and when they do it is left up to the agencies.

* * * * *

How-to-do-it is always a big question on the farm. Thus it is with considerable pride that the National Joint Committee on Fertilizer Application is bringing out a revision of the booklet, "Methods of Applying Fertilizer."

Since 1948 when the previous edition was published, there have been a number of advances, primarily toward better placement of fertilizer and greater use of liquid fertilizers.

The revised booklet, published by the National Plant Food Institute, includes sections on liquid fertilizers, new application equipment, forest crops, field crops, vegetable crops, tree and nut crops.

* * * * *

Whether or not we are having a "recession" depends upon whom you talk to. Bankers in Washington tell us that some firms that were making good money last year are not doing as well now. Other firms which were not faring well last year now report they never had it so good.

The bankers suggest the reason may be that many people are changing their patterns of spending. Whether a firm is doing well or is in a slump seems to depend on whether people are shifting toward or away from the firm's products.

One thing which seems to be certain is that there is no recession on the farm. Both farm prices and total net farm income are up 9 to 10 percent from the same time last year.

•

Increases Cotton Yields

A growth regulator developed by the United States Rubber Co., New York, has increased cotton yields in some areas from 12 to 30 per cent during a three-year test period, according to Robert A. Kortsen, farm advisor in the University of California's Agricultural Extension Service.

The chemical used in the Imperial Valley experimental plot and field tests was Duraset-20W, a product of the Naugatuck Chemical division of the rubber company. It will be offered for use on desert grown cotton for the first time this year.

The chemical was first tried on small experimental plots in 1955. In 1956 and 1957 it was tested on four commercial-scale plots in the Imperial Valley on Acala 4-42 and Delta Pine 15 varieties of cotton.

Yield increases were obtained with both varieties, Mr. Kortsen said. In all tests, with the exception of one, yield increases on treated plots ranged from 12 to 30 per cent over untreated plots. Cotton gin reports indicate the chemical has no effect on grade, but in most cases the gin turnout was increased approximately one percent.

Fertilizer Views and News

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

By Vincent Sauchelli



A Further Discussion On Enzymes and Their Function

ENZYMES were referred to in a previous article in connection with the role of trace elements and hunger signs of deficiencies. Several readers, apparently unfamiliar with the word, have requested an explanation with examples. What follows is an attempt to give briefly an elementary explanation.

The dictionary defines "enzyme" as any of a class of naturally occurring, organic substances that speed-up or catalyze specific changes in plant and animal materials. The word is derived from the Greek and means "to leaven." Prior to the scientific age, such substances were generally referred to as "ferments." Enzymes are produced only by living cells, but their specific action does not depend on the life processes and they are not consumed in the chemical reactions in which they may be involved.

A simple illustration: try burning a lump of sugar with a match. The sugar won't burn. But dust a little cigarette ash on it and presto, it burns. Yet, the ash itself is not affected. It promoted the burning action but remained unaffected by the combustion. The ash acted as a catalyst or inorganic enzyme. Throughout nature thousands of fundamental chemical reactions occur in the presence of these action-accelerating substances called catalysts or enzymes. The characteristic of a catalytic or enzymatic reaction is that the stimulating substance—the cigarette ash is our example—is not itself changed in any way.

As previously mentioned, only living cells can create an enzyme, and enzymes are essential to the life processes. Every agricultural product in

the natural state contains the enzymes it has created for its own use. Modern industry is finding new and increasing uses for enzymes in food processing and other applications. A broader and deeper knowledge of how they function is being developed by government and industrial researchers in order that they may be utilized more effectively. For example, "shoe-leather" steak on the American dinner table will soon be the exception, say these investigators. They have been able to extract enzymes from pineapples, figs and papayas which can tenderize the tough, connective tissues and muscle fibers found in the meat.

It is estimated that meat packers currently use more than 20,000 gallons of enzyme meat tenderizers a month. The general practice of obtaining tender, juicy steaks is to grain-fatten the steer and age the meat. Now, the chemically-produced enzyme tenderizers will be able to do the job in less time and at lower cost. The meat packer dips meat in the tenderizing enzyme solution 60 seconds and promptly freezes the meat to halt the enzyme action. A strong solution of pineapple-derived enzyme will dissolve a piece of meat in 12 hours. Meat tenderizers are now being re-tailed for home use.

The saliva of humans contains an enzyme called ptyalin which is soluble. Pepsin is another familiar substance, which is in fact an enzyme. Enzymes are essential to man in almost every chemical reaction in the digestion of food in the mouth, the stomach and the intestine. They accelerate reactions at body temperature, transforming starch into sugars, fats

to fatty acids and proteins to amino acids.

Consider a dry grain of wheat at rest. Plant it and soon things happen. It sprouts. It grows. We know it has to burn up its reserve of oil and starch to get the energy with which to grow, and yet it remains cool and moist. That sprouting grain had something in itself which speeds up its metabolism without creating excessive heat. That something is its enzymes, which are produced by all living cells for use in their vital functions. Each one of the multitude of chemical reactions which are constantly taking place in every living cell has a specific enzyme to hurry it along. These mysterious substances being protein in nature have so far baffled chemists in their efforts to reproduce them synthetically. However, we have learned how to extract them from living tissues.

Many foodstuffs are rich in certain enzymes. Cereal grains, and starchy vegetables, for example, are well supplied with them for transforming starch into sugar. Cut apples and peaches darken because of the presence of an enzyme which oxidizes certain substances. We have learned how to reduce the action of enzymes which destroys the value of raw foodstuffs. Heat will destroy enzymes and cold storage will minimize their activity. Dehydration and immersion in syrup or the retarding of the respiratory enzymes of raw fruits and vegetables by an atmosphere of carbon dioxide are other practices to eliminate or control enzymatic influences.

All persons in the fertilizer industry perhaps do not know that today more than 10 million tons of sulfuric acid is produced synthetically with the use of a catalyst containing

(Continued on Page 95)



Arcadian[®] News

Volume 3

For Manufacturers of Mixed Fertilizers

Number 7

HOW TO hit NITROGEN on the nose!

Methods that Help Insure Accurate Formulation

Do you use plenty of nitrogen in formulating high-nitrogen fertilizers and then find that your analyses do not always meet minimum guarantees?

Are you forced to resort to excessive formulation to get sufficient nitrogen into high-analysis fertilizers?

Have you ever detected the pungent odor of ammonia emerging from the exhaust pipe on the roof of your plant?

When you are faced with any of these problems, it will pay you to take a careful look at the equipment and the methods you use in ammoniation.

In manufacturing pulverized or granulated high-analysis fertilizers, by batch or continuous mixing, failure to hit nitrogen content "on the nose" is often due to poor combination of ammonia with superphosphate and any added acids in the mixer.

Uniform distribution of the acid throughout the mass is just as important as uniform distribution of the ammoniating media. Uniform distribution insures effective utilization of all ingredients.

Efficient maintenance and use of correctly-designed distribution pipes are essential to uniform distribution of the acid and the ammoniating media. Correct techniques of operation must be observed to derive full value from the equipment.

A distribution pipe is basically a metering manifold and accuracy of meter-

ing ingredients is vitally important. This accuracy can be destroyed by corrosion and abrasion of the pipe. Corrosion and abrasion are cumulative and may pass unnoticed in their early stages unless a careful checking procedure is diligently maintained.

Improper use of acids and ammoniating media often causes the formation of many large particles too early in the ammoniation stage. This seriously limits further ammonia take-up by the superphosphate. Some of the unreacted acid may be buried inside these particles. Addition of more acid aggravates the situation and is a costly way of handling the problem. In extreme cases, it may also be dangerous.

Important Checkpoints

When your analyses indicate a loss of nitrogen in the ammoniation process, your first checkpoints should be: 1) Is your manpower efficient? 2) Are you using the proper distribution pipes and

are these maintained in the best possible operating condition? 3) Are your formulation techniques correct for the fertilizers you wish to produce? 4) Are you using the ammoniating solution that is best suited to your methods and equipment?

Occasionally, loss of nitrogen occurs in the dryer. This may be due to excessive firing of the furnace as a result of poor installation or poor maintenance of the dryer. It may also be caused by forcing equipment beyond its capacity during periods of peak output.

In storage, there is seldom any appreciable loss of nitrogen from conventional formulae. When this does happen, a thorough appraisal of every phase of production should be made immediately.

Ask Nitrogen Division

When you have a formulation or an ammoniation problem, it will pay you to get the advice of Nitrogen Division, Allied Chemical, technical service men. These men have a thorough knowledge of the entire operation of a fertilizer plant. They often assist in the selection of equipment and in the suggestion of more efficient, money-saving methods all along the production line.

This service is available to Nitrogen Division customers without charge. Get the facts from your Nitrogen Division salesman . . . or contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y. Phone: Hanover 2-7300

Technical Tips

ACIDS REQUIRE SAFE, EFFICIENT HANDLING

Efficient, economical and safe use of acids in the manufacture of mixed fertilizers depends on proper equipment kept in good working condition and a thorough knowledge of the techniques involved. Improper handling can be expensive and hazardous.

When acid and ammoniating equipment does not function correctly, due to poor handling, faulty design, or deterioration, valuable acids and other ingredients can be wasted without producing fertilizer of the desired analysis and physical condition.

Thorough and uniform distribution of the acid in the mass is vitally important. Although the acid is not volatile and will not escape from the hot mass, it must combine with ammonia to be effective. Volatile ammonia will not "hunt" through the mass to find acid concentrated in spots. Among other things, properly-designed distributor pipes, free of corrosion and abrasion, are essential to uniform distribution of acid.

To achieve a desirable liquid phase in producing granulated fertilizers, heat may be substituted for some moisture. In accomplishing this, the use of considerable quantities of sulfuric acid is advisable to remove more of the controlling influence of water.

In using acids, it is questionable practice for the operator to attempt to solve poor performance of equipment by improvised procedures. For example, many operators have discovered that ammonia fumes will disappear with the addition of more acid.

This is a dangerous procedure, especially if satisfactory results have been previously obtained without the extra acid. Even a small change in the amount of any ingredient may wreck the formula, unless the change has been carefully studied and deemed advisable. Check your equipment and your methods before changing your formula.

Care should be taken to prevent sulfuric acid from contacting a concentrated region of potassium chloride. This pro-

motes efficiency and safety and avoids air pollution problems.

In controlling amounts of acids through metering, weighing or measuring, changes in specific gravity due to temperatures should be taken into consideration. The viscosities of sulfuric and phosphoric acid at low operating temperatures can seriously affect the operation of metering devices. This problem may be solved by the use of magnetic meters or by warming the acid for metering.

It is safer to control the flow of acid by an electrically-driven pump than by air pressure. A pump can be quickly stopped by remote control, whereas air pressure is more difficult to handle.

Because of their limited pressure, centrifugal pumps are usually used for both acids. These are made of stainless steel. Cast iron and black steel are sometimes used for 60° and 66° sulfuric acid. Stainless steel mechanical seals and Blue African asbestos packing and some of

the new synthetics are used in pumps.

The action of sulfuric acid on steel and cast iron will release hydrogen which will develop excessive pressure in confined space, such as between closed valves in a line. Hydrogen combined with air can form an inflammable or explosive mixture which necessitates precautions against lights, fires and sparks.

The use of water to flush out steel or stainless steel equipment, including flowmeters, has resulted in severe corrosion and faulty performance. Dilute sulfuric acid is corrosive to some materials that are resistant to the more concentrated 60° and 66° Be sulfuric acids. Even small amounts of moisture in the air may cause localized corrosion if it contacts sulfuric acid.

For safety to employees, all personnel handling acids should wear special goggles, full face masks and heavy rubber gloves. Rubber is quickly attacked by sulfuric acid. Large flow showers should be provided near the dryer areas.

IN THIS WORLD ... by Gifford

FERTILIZER 10-10-10
10% NITROGEN
10% PHOSPHOROUS
10% POTASH

NUMBERS ON EVERY BAG OF FERTILIZER SHOW THE PERCENTAGE OF EACH NUTRIENT... AND ALWAYS IN THE ORDER AS SHOWN ON BAG ABOVE!

NITROGEN...GIVES CROPS AND GRASS HEALTHY GREEN COLOR, VIGOROUS GROWTH, HIGH YIELDS.

PHOSPHOROUS...AIDS ROOT GROWTH, GIVES PLANTS VIGOROUS START, HASTENS MATURITY, STIMULATES BLOSSOMING AND SEED FORMATION.

POTASH...MAKES STEMS AND STALKS STIFF, PLANTS DISEASE RESISTANT, GRAIN AND SEED LARGER!

FERTILIZER
OFTEN DOUBLES OR TRIPLES CROP YIELDS

Like SQUANTO'S FISH, MOST OF TODAY'S MANUFACTURED FERTILIZERS CONTAIN THREE SEPARATE PLANT FOODS!

Here is another in the series of educational news features on fertilizer now being released to more than 1,000 newspapers by Nitrogen Division, Allied Chemical.



NEW BUSINESS FROM OLD CUSTOMERS

Do you remember the story about the prospector who spent years searching the far-away hills for gold and then found nuggets in his own back yard?

If you seek new markets for a bigger tonnage of your brand of fertilizer, it may pay you to concentrate your efforts on your own customers in territory near your plant where transportation costs are low and profits are high.

Most farmers are not using nearly as much fertilizer as they could profitably use. For proof of this, check actual tonnage used as compared to official state fertilizer recommendations. You'll discover a big difference, whether you are in Carolina or Kansas, Coachella or Kalamazoo.

Consider the state of Georgia, for example. It's an old state, from a fertilizer standpoint. Georgia farmers have been using fertilizer for a long time and

now buy more than 1½ million tons per year. But there is a big opportunity for more fertilizer sales.

If all the cotton, corn and pasture acreage in Georgia was fertilized according to official recommendations, the farmers of the state would be using 750 thousand *more* tons of mixed fertilizer and 500 thousand *more* tons of nitrogen products for top-dressing. Along with this, they would use five times as much lime as they now use. As a result, cotton, corn and pastures would produce an extra \$200 million in farm income for Georgia farmers.

Yes, Georgia cotton needs 40 to 50% more fertilizer for the best yields and profits . . . corn needs 60 to 100% more fertilizer . . . small grains, 50% more . . . soybeans, 100% more . . . and pastures, 200% more. Even high-value crops, such as tobacco, citrus and truck, could profit

from 10 to 30% more fertilizer, according to state college recommendations.

Georgia recognizes the need for more plant food, and the state extension service and the fertilizer industry are co-operating in a campaign to urge farmers to get bigger yields and better profits by using more fertilizer. This joint effort is making progress in Georgia. Such a campaign can be equally successful in other states.

In the corn belt, for example, only 40% of the corn crop was fertilized in 1950. By 1954, 64% of the corn in this area got some fertilizer. There are still a lot of acres of corn which get no fertilizer.

And most of the corn that is fertilized needs more fertilizer than it gets. In 1950, the fertilized acre of corn in the corn belt received the equivalent of 200 pounds of 4-12-9, and in 1954 it got the equivalent of 200 pounds of 12-14-14. Many good corn belt farmers use the equivalent of 800 pounds of 20-10-15 and many more need to, year after year.

Your Best Market

Wherever you sell fertilizer, your best market is near your plant. Your own customers can be sold on the idea of using more and better fertilizer.

Per-acre use of fertilizer is gradually inching upward. How can you make it move up faster? It helps to know, and to quote, your state extension service fertilizer recommendations. Most farmers are far below official recommendations in their use of fertilizer.

It pays to cooperate in the soil testing program in your state. When you have accurate knowledge of the plant food needs of a field, you are in a better position to sell the right fertilizer analysis. This produces the best results for the farmer and for you.

Most soils east of the Missouri River need lime to produce top benefits from fertilizer. Starting an off-season lime-spreading service helps build your business as well as the farmer's.

It pays to push high-analysis mixed fertilizer. You save on hauling and handling, and so does the farmer. Since most crops need a high-nitrogen fertilizer program, putting more nitrogen into your mixed fertilizer will benefit both you and the farmer. The farmer gets better crops and you put more of your straight nitrogen sales into your mixed fertilizer bag.

These are only a few ideas that will help you build new business among your present customers in your own sales area. The territory near your plant is a big tonnage opportunity.

HERE'S THE BIG LINE OF

Arcadian

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. in. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

**Other ARCADIAN® Products: N-dure® • UREA 45 • A-N-L® Nitrogen Fertilizer
Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia**

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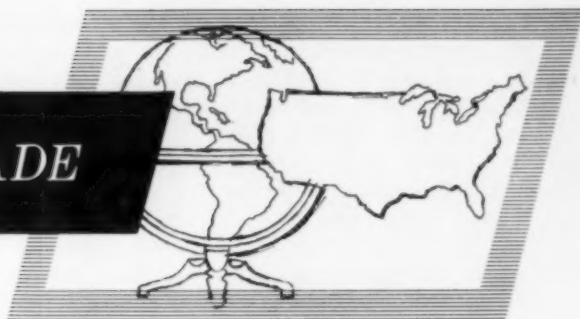
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 Omaha 7, Neb., P. O. Box 166..... Bellevue 1464
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NEWS about the TRADE



White Pres. of Nitro Div.

Allied Chemical & Dye Corp., announced two new presidents of its Nitrogen and International Divisions.

Jacob White was appointed president of the Nitrogen Division. He was formerly vice president.

William Winfield was named president of the International Division, of which he was formerly vice president.

W. Wickersham, vice president of the International Div. will be in charge of export operations.

Potash Plant Nears Completion

Potash Company of America expects to finish work on its new Canadian plant at Saskatoon, Sask., by late September. The original target date for completion of the plant had been November, but this date will probably be anticipated by at least a month or six weeks. Production will begin, it is expected by early December. The mine shaft is down as far as the potash bed, and the concentration and quality of the ore are reported to be equally as high as test borings had indicated they would be.

Five Swift Changes

Swift & Company, Agricultural Chemical Division, announced changes in the management of five Plant Food Factories June 30. R. H. Woodward becomes manager of the Atlanta, Ga. Division and E. H. Rappe moves to Columbia, S. C., as manager.

A. Oines assumes management of the Baltimore Division succeeding A. W. Langdon who is transferred to Calumet City, Ill.

John A. Silkman, assistant manager at N. S. Yards, Ill., becomes manager at Shreveport, La. succeeding

W. L. Gray who is transferred to Tyler, Texas, as manager of the East Texas Products Company Division.

W. P. Dean was named agricultural plant food marketing manager of Swift's Agricultural Chemicals Division.

D. Hayley Joins NAC

Denis Hayley has joined the NAC staff, Washington, D. C., to work in public relations and on the NAC information services. He formerly was product manager for a unit of Diamond Alkali Co., Cleveland.

Fertilizer Raw Material Prices Weaken

ANNOUNCEMENTS of prices of fertilizer raw materials for the new fertilizer season which have been made by producers over the past few weeks have included a number of major price reductions, bringing quotations down to the lowest levels which have applied for a number of years. The lower prices have followed a slow '58 season which has been characterized by price concessions by many raw material producers in an attempt to stimulate sales and enlarge their individual shares of a declining market.

Potash Company of America issued a new price schedule on muriate of potash and sulphate of potash, June 15th, to cover the fertilizer year, July '58 through June '59. On 60% muriate the contract level was set at 32¢ per unit of K_2O for July-August shipment, 33¢ for September-October, 34¢ for November-December, 36½¢ January-May, 1959, and back to 32¢ per unit in June, 1959. The above prices are subject to a special discount of 2¢ per unit of K_2O on bulk, or \$1.20 per ton on bagged material, which was originally to have been held by the supplier pending acceptance by the buyer of the full contracted tonnage. This provision was later changed and Potash Company advise that the special discount will be credited on individual invoices as material is ordered out. The above schedule was announced to apply only

to tonnage contracted for prior to July 1, the price to be increased 2¢ per unit on tonnage contracted for after the July 1 date.

Earlier it had been announced that American Potash & Chemical Corp. had lowered its quotations on agricultural potash by 2.5¢ a unit below the previous year's level "to meet competition."

Nitrogen producers have also been active with price reductions. Phillips Petroleum Co. recently announced an "off season" schedule of reduced prices to encourage advance buying of anhydrous ammonia for next season. The new schedule will be \$80 a ton during August and September, and \$84 a ton for October, November and December. The price is currently \$88 a ton.

Monsanto Chemical Co. and Escambia Bay Chemical Co. announced reductions in their basic price schedules on nitrogen solution fertilizer in mid-June. The price cut was from \$128 down to \$120 a ton, an \$8 a ton concession, and both indicated they were making these reductions in an effort to remain "competitive" in a declining market. Base prices are supposed to be in effect from January 1 through June 30. Monsanto also announced a new line-up of "off-season" discounts on nitrogen solution fertilizer, quoting \$10 a ton lower than the basic January through June

(Continued on Page 96)

Bill Reaches Senate Floor

A proposal to authorize continuing research studies of the effects of chemical poisons on fish and wildlife resources has been reported favorably by the Senate Committee on Interstate and Foreign commerce. The bill, S. 2447, would direct the U. S. Fish and Wildlife Service to obtain data about insecticides, fungicides, and herbicides and their uses so that "forests, croplands, and marshes can be sprayed with minimum losses of fish and wildlife."

A provision that would have authorized an annual appropriation of \$280,000 for the research program was deleted at the request of the Interior Department who feared that authorization of a set amount could hamstring the studies in years when higher appropriations might be needed. The amount budgeted for pesticides research for the Fish and Wildlife Service during the coming fiscal year is \$56,000. Conservationists are supporting a move to get an additional \$300,000 for the work.

Hooker Adopts New Name

Hooker Chemical Corporation is the new name adopted by the Hooker Electrochemical Co., Niagara Falls, N. Y. The new name is said to more accurately represent Hooker's wide variety of chemicals and chemically-made plastics, no longer limited to the products of electrochemical manufacture.

At the same time, the consolidation of Shea Chemical Corp. into

Hooker Chemical Corp. was effected. Vincent H. Shea, formerly president of Shea, has been elected a director of Hooker.

NH₃ Operations In Black

The petrochemical operation of the Standard Oil Co. (Ohio) at Lima, Ohio, where the company turns out ammonia and other nitrogen-containing chemical fertilizers, is expected to show a profit this year for the first time.

A report stated April was Sohio's best petrochemical month. Chemical fertilizer sales were aided this spring by favorable farming weather in its principal midwest markets—Ohio, Michigan, and Indiana.

Montana Association Meets

The Montana Plant Food Assn. recently held its first annual summer meeting and heard F. Todd Tremblay, Northwest representative of the National Plant Food Institute, discuss a recent survey on the farmers attitudes toward the use of fertilizers.

Mr. Tremblay told how this survey could be used to increase the proper use of fertilizer in Montana.

Jesse Green discussed the importance of phosphorus in animal feeding in Montana. He said that there is much evidence to show that the quality of hay and pasture depends as much upon its phosphate content as upon the percent of protein.

Dean Travis, president of the Montana association, was chairman of the two-day session.

Carbide Shifts Three

Three technical representatives recently were transferred by the Union Carbide Chemicals Co., division of Union Carbide Corp., N. Y.

The transfers are: Paul A. Hinz to the Philadelphia district, Francis R. Kean to the Newark district, and C. D. Schmidt to Detroit.

27th Packaging Exposition

Many of the major multiwall bag manufacturers sponsored exhibits at the 27th National Packaging Exposition held in New York's Coliseum, May 26 to 30. In addition, the Dave Fischbein Co., Minneapolis, Minn., displayed its portable bag closing equipment. Accessory items displayed by Fischbein include suspension units, carriage conveyor units, and tape binding attachments.

The International Paper Co., New York, presented a 74-foot display of its products. The company's Bagpak Division presented information on its multiwall paper bags and its bag closing and sealing machines.

Information was made available by the Monsanto Chemical Co., New York, on the first heavy-duty industrial shipping bags of polyethylene film now being made available commercially from Chippewa Plastics Inc., Chippewa Falls, Wisc. The bags, which have undergone months of test shipping of a number of products by Monsanto, are fabricated from 10-mil polyethylene film.

The West Virginia Pulp and Paper Co., New York, exhibited its Kraftman Clupak stretchable paper.

Packing machinery and multiwall bags were shown by the Union Bag-Camp Paper Corp., New York. The Delaware Barrel and Drum Co., Inc., Wilmington, Del., displayed its polyethylene molded drum, a combination of polyethylene drum and fibre drum overpack that is said to be exceptionally sturdy.

The Bemis Bro. Bag Co., St. Louis, exhibited both multiwall bags and bagging equipment. The Shellmar-Betner Division of the Continental Can Co., Mt. Vernon, Ohio, was represented by a display of Duotite bags in the Continental booth.

Florida East Coast Fertilizer Company in 35th Year

Florida East Coast Fertilizer Company, South Florida's oldest fertilizer manufacturing plant, is celebrating 1958 as its 35th business anniversary year. It was incorporated on May 22, 1923. Modern in mechanization and technique, the plant has a capacity for mixing and bagging 30 tons of mixed fertilizer per hour.

More than 500 different fertilizer formulas are prepared on request.



Velsicol Appoints Hightower

Bill Hightower has been appointed technical sales representative for the Velsicol Chemical Corporation, Chicago. Mr. Hightower joined the company's Agricultural Chemical Division, and is providing technical and sales service for Velsicol's insecticides, gibberellins, solvents, and EMMI fungicide. He will operate in the Tennessee-Arkansas area, under the direction of L. F. Bewick. His headquarters are at Greenwood, Miss.

Before joining Velsicol, Mr. Hightower was a sales representative for Diamond Black Leaf Co.

DDT Spray Program Upheld

Federal Judge Bruchhausen in Federal District Court, Brooklyn, denied petition of 14 Long Island residents to stop the USDA and N. Y. State from spraying DDT to control gypsy moth. He ruled that the mass spraying was "a valid exercise of the state's police power." He said also that the plaintiffs had presented no proof that the spraying had impaired anyone's health, or that it had caused any loss of birds, fish, bees, etc. He further said that DDT did not injure plants.

W. Va. Bag Div.—New Plant

The West Virginia Pulp and Paper Co., New York, has formed a Multiwall Bag Division which is comprised of four multiwall bag plants recently acquired by the company.

Field responsibility for the division's activities, including overall direction of the plants at Wellsburg, W. Va., Mobile, Ala., New Orleans, La., and St. Louis, Mo., will be shared by two regional managers. Sheldon Y. Carnes, formerly vice-president of Arkell and Smiths, will be regional manager with headquarters in New York. Jason M. Elsas, formerly president of Fulton Bag and Products Co., will be regional manager with headquarters in New Orleans.

West Virginia has also established multiwall and grocery bag manufacturing facilities in a newly-constructed plant in Torrance, Calif. This is the company's first manufacturing plant west of the Rockies.

Recommend Pyrethrum for Drosophila On Tomatoes

USE of a pyrethrum dust containing 0.1% stabilized pyrethrins, or approximately 0.08% stabilized pyrethrins plus piperonyl butoxide, is recommended by the National Canners Association for controlling *Drosophila* on tomatoes in the field immediately after harvest. A special committee of the association on Tomato Products Sanitation (J. J. Wilson, H. J. Heinz Co., chairman) has recently completed a study of the subject. It was guided in shaping its recommendations by the advice of a panel of entomological advisers, members of which were Dr. B. B. Pepper, New Jersey Experiment Station; Drs. A. E. Michelbacher and W. W. Midlekauff, California Experiment Station; Dr. W. E. Bickley, Maryland Experiment Station; Dr. A. C. Davis, N. Y. State Experiment Station, and H. C. Mason, Entomology Research Division, U.S.D.A.

The committee emphasizes that its recommendations are necessarily rather general, and that detailed information on formulation of insecticides and timing of applications should be sought locally from state agricultural experiment stations or extension services.

The report, just released by National Canners Association, Washington, recommends approved cultural practices in the field, to be supplemented by suggested harvesting and handling practices as well as treatment of tomatoes in the field with pyrethrum dusts. The section of the report dealing with the dust treatments follows:

"Extensive research on the part of entomologists and canners conducted during the past four years clearly points out the value of and need for *Drosophila* control measures immediately after each picking. Evidence indicates that when adult populations of *Drosophila* are in the field eggs will be deposited in fresh mechanical cracks caused in the harvesting and handling of the fruit. Therefore, every effort should be made by the grower and canner to prevent this egg deposition. Under usual Western conditions, the majority of the *Drosophila* egg deposition occurs in

the early morning and early evening. Fruit which is harvested and taken from the field except during these hours may not require treatment immediately after harvest. Fruit which is to be left in the field during the morning and evening hours, however, should be given a post-harvest treatment. Under Eastern and Midwestern conditions in the latter part of the harvest season, eggs may be deposited by adult *Drosophila* during any part of the day. Under these conditions when populations of *Drosophila* exist in the field, fruit should be treated as soon after harvest as possible and before being loaded for transport to the receiving station or canning plant.

"Extensive experiments and industry experience on the West Coast on control of *Drosophila* fly contamination in tomatoes with pyrethrum dust containing approximately 0.1% stabilized pyrethrins or approximately 0.08% stabilized pyrethrins plus piperonyl butoxide indicate that the above dusts, properly applied into palletized lug boxes of tomatoes with a portable power duster to obtain a light, well-distributed coating, will repel *Drosophila* flies for up to 24 hours and almost stop further egg deposition for this period. Although this treatment has proved effective in preventing egg deposition, it may not be highly effective in killing the adult flies.

"Similar experimental work conducted by New Jersey Experiment Station workers has shown similar results. The dusting of tomatoes in the hampers immediately after harvest has resulted in a significant reduction in egg deposition in the presence of high adult populations. It is important that treatments be made as soon after picking as possible. Under Eastern and Midwestern conditions when the tomato baskets are stacked at the end of the rows, it may be possible to dust these containers of tomatoes with portable equipment before the fruit is loaded on the truck.

"It has been brought to our attention that some commercial dusts available last year were improperly formulated and lacked stable pyre-

(Continued on Page 95)

SLACK SEASON?



NOW'S THE TIME TO PLAN FOR IMPROVED PACKAGING

Right now, while things are slack, you are probably studying your plant operations—asking yourself questions like these:

- Can I speed up my line—increase production?
- How can I get more accurate weights?
- Should I pack in open mouth or valve multiwalls?
- Would the pasted valve bag give me a lower cost per ton?
- Are my bag sizes and basis weights at the practical minimum?
- Can I improve my bag design?

—and you can probably think of other questions, too!

It will pay you to get answers from the St. Regis Sales Engineer. He knows bags; he knows filling and weighing equipment; he knows the complete packaging operation. St. Regis makes both open mouth and valve bags, designs and builds bag filling machines, helps with bag design. This experience means that you'll get right answers to your questions.

St. Regis can give you the help you're looking for in improving your packing, your weight control, the speed of your operations—and *your profits!* So simply write today to: Multiwall Packaging Division, Dept. AC-758, St. Regis Paper Company, 150 East 42nd Street, New York 17, N. Y.

MULTIWALL PACKAGING DIVISION

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PAPER COMPANY

150 East 42nd Street, New York 17, New York

Richfield Begins Production

The Richfield Oil Corp., Los Angeles, has placed into full-scale operation its \$65 million benzene-toluene unit at Watson, Calif. The new unit will produce some 18 million gallons of nitration-grade benzene, and will produce 18 million gallons per year of toluene.

Monsanto Lists Appointments

The Monsanto Chemical Co., St. Louis, has announced a series of personnel changes that includes the appointment of W. R. Bone as product sales manager of agricultural chemicals sales for the company's Inorganic Chemicals Division.

Stewart D. Daniels has been appointed technical service manager for agricultural chemicals and John C. Doctor has been named associate product sales manager for direct application liquids.

Leroy Donald has been appointed chief agronomist for the Inorganic Chemicals Division and J. R. Glatt-haar is assistant director of agricultural chemicals sales. R. W. Goldthwaite is associate product sales manager for fertilizer manufacturers and B. M. Machen has been appointed district sales manager of a newly established agricultural chemicals sales office at New York.

Complete Mexican Facilities

Additional plant facilities have been constructed at Hermosillo, Sonora, Mexico, by Insecticidas Diamond del Pacifico, S. A. de C. V., an affiliate of Diamond Alkali Co., Cleveland, Ohio.

The company already operates a plant in Ciudad Obregon, Sonora, Mexico. The new facilities offer more service on a localized basis.

Consider Bill to Date Pesticides

The chairman of the House Agriculture Committee, in Louisiana reported that they are considering a bill which will require the dating of agricultural insecticides. If the bill is passed, insecticides will have to be labeled for seasonal use, and insecticide manufacturers will be required to recommend storage practices. This

action follows numerous complaints by farmers last year that some insecticides failed to give control.

Ira Vandewater Honored

Ira Vandewater, president of R. W. Greeff & Co., New York, was guest of honor at a cocktail party in Carlton House, New York, last month marking his fortieth anniversary with the company.

Mr. Vandewater began his career in the chemical industry in 1906 with T. M. Curtius. The following year he joined National Aniline & Chemical Co. and remained with that firm until 1918 at which time he entered the Greeff organization.

To Build Process Laboratory

The Stauffer Chemical Co., New York, has completed plans to build a process development laboratory at its research center in Richmond, Calif. It is anticipated that the new unit will be ready for occupancy by the end of September.

Discuss Spray Drift

Danger by drift to susceptible crops from aerial application of hormone weedkillers such as 2,4-D and MCPA was discussed by the British Weed Control Council at a recent meeting reported in the May 31 issue of *Chemical Age*.

The hazard is said to be greatest when low volume spraying is practiced. The council felt strongly that it should be widely known that aerial spraying of hormones near susceptible crops such as tomatoes, beets, orchard trees at flowering time, lettuce, and glass-house crops, is a dangerous practice and should be avoided.

Bollworm Heads Pest List

The corn earworm (also known as the bollworm or tomato fruitworm), the housefly and the mosquito were named more often than any other insects in State reports of some of the more important pests of 1957, according to the U.S.D.A.

Plant mites, the European corn borer, aphids, and grasshoppers also were frequently mentioned as crop pests, and termites and cockroaches as nuisances to man. Among pests of livestock, the horn fly, cattle grubs, ticks, and cattle lice were most often listed.

Name Searle President

Robert F. Searle has been elected president of Arkell & Smiths, New York. He succeeds Sheldon S. Yates, who continues as chairman.

Mr. Searle formerly was vice president in charge of manufacturing. He has been with the company since 1948.

3 NPFI Grants To Midwest

The National Plant Food Institute has announced grants to three research projects in the midwest. A \$2,500 grant has been made to Michigan State University soils scientists and agricultural economists working on a fertilizer research project to measure crop response to fertilizer use and then evaluate this response in economic terms.

A grant to Ohio State University will help support corn fertilization demonstrations by vocational agriculture teachers. The third grant, to the Minnesota Agricultural Extension Department, will sponsor pasture fertilization demonstrations this year.

Attend K-State Systemic Conference, May 26

Among the more than 150 people attending the third work conference on systemic insecticides for control of livestock insects at Kansas State College, Manhattan, May 26 and 27, were (left to right): E. F. Knippling, director, Entomology Research Division, U.S.D.A.; Herbert Knutson, head of the K-State department of entomology; Herman



Aaberg, president of Livestock Conservation Inc.; and Justus C. Ward, USDA.

HOW TO GET THE MOST FOR YOUR FERTILIZER MACHINERY DOLLAR

Before You Buy, Check Sturtevant's Answers to These Key Questions

Q - How much experience is built into the design?

A - You get the benefit of 84 years of practical fertilizer industry experience in each Sturtevant machine you buy. Unrivaled for fertilizer plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

Q - Is the machinery engineered for peak-load efficiency?

A - All details in each Sturtevant machine have been proved by years of peak-load performance in fertilizer plants. Rugged construction that withstands the most slam-bang use, gears designed to always perform dependably, bearings that stand up under the heaviest loads, all can be taken for granted in Sturtevant ma-

chinery. Many Sturtevant machines have been operating at top capacity and efficiency for well over a quarter of a century.

Q - How accessible is the machinery for clean-outs and repairs?

A - Clean-outs are a constantly recurring problem in the operation of a fertilizer plant. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute".

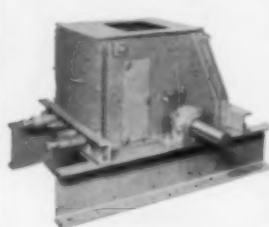
For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your fertilizer unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, 123 Clayton St., Boston 22, Mass.



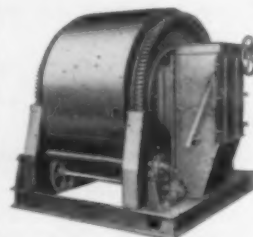
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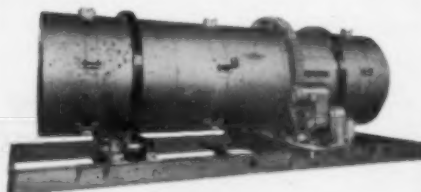
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The "OPEN-DOOR" to lower operating costs over more years

IMC's Promotional Program To Give "Full Orbit" Service



Pat McGinnis, Klau-Van Pietersom-Dunlap, Inc.; H. F. Roderick, vice-president IMC Phosphate Chemical Division; T. M. Ware, newly elected IMC Presi-

dent; N. C. White, vice-president IMC Potash Division; F. B. Bowen, production manager, Phosphate Minerals Division; J. D. Zigler, genl. mgr., Plant Food Div.

THERE's not going to be any talk of "recession" around the far flung industrial empire of International Minerals & Chemical Corp., this summer and for months to come. In every one of the company's 69 plants and mines in 26 states just about everybody connected with the sales department is in "full orbit" behind a new customer merchandising service, designed to help fertilizer manufacturers sell more fertilizer.

The promotional plan, which IMC's marketing management claims is without parallel in the fertilizer industry, has been christened the "Full Orbit Service." It's based on the principle that IMC cannot continue to sell more of its raw fertilizer components if the manufacturers who use these materials cannot move their finished products from their mills and warehouses. The "Full Orbit Service," a term derived from the predominant topic of current conversation, is designed to aid manufacturers in attaining the goal of increased fertilizer sales.

The well rounded program was announced during a 3-day conference held in Chicago, May 26-28, to launch IMC's field salesmen on their "full orbit" course. Meeting rooms at the Sheraton Hotel were appropriately decorated with rocket models and other symbols of the guided missile age, suggesting the theme of the promotion.

At a news conference with representatives of the trade press, A. E. Cascino, IMC vice president in charge of marketing, explained that the "full orbit" plan is based on findings from a survey made by an independent agency, Marketing Facts, Inc., of Chicago, for which some 100 manufacturers in some 130 locations east of the Rockies were interviewed. The survey disclosed what these IMC customers feel they need in the way of marketing assistance. This help IMC has set out to provide in its new sales program.

In essence, Mr. Cascino said, the "full orbit" merchandising plan is based on a library of "how to" booklets, written by IMC experts, in the

language of the fertilizer industry which present the manufacturer with practical aids for meeting his problems.

First of the series is a booklet, "Know Your Market," which explains how the manufacturer can go about making a survey and scientific analysis of his marketing area to determine how he can develop its fullest capacity.

There's another booklet on "Sales Manpower," which "takes the wraps off salesman's performance," enabling the manufacturer to select and train salesmen and direct a hard-hitting sales campaign by this force.

A third booklet is a guide to "Pay-off Meetings," which goes into detail on the mechanics of how to put life and enthusiasm into meetings with salesmen, dealers and farmers. It's keyed to the idea that "planning makes the difference" in the pay-off from such meetings.

A fourth booklet, "Making Promotion Dollars Pay Off," treats the problem of lagging advertising and sales promotion efforts. It tells how to fit the advertising program into the complete marketing drive, so that more impact per dollar will result.

Another booklet on "Saving Transportation Dollars," and one on IMC's technical services acquaint the customer with the company's facilities for assisting their customers in these fields.

The "full orbit" merchandising service, Mr. Cascino said, is being presented by IMC salesmen who will serve as teachers in man-to-man contact with the company's customers. There are "no strings attached," he stated, and it is being made available in the firm belief that, if IMC helps a manufacturer move more fertilizer to the farm, that manufacturer will remember the company on his next order.

"The job of selling today," he remarked, "is a challenge that needs new methods, new tools, often completely new selling techniques. In this 'full orbit' merchandising program we believe we have what is needed to help our customers keep out ahead in the race for sales."



Write for leaflet showing details of specially modified sprinkling can; also contains other useful data on use and handling of Oldbury sodium chlorate, the original weed killer.

This is how simple it is to kill all these weeds:

*Russian knapweed
Bermuda grass
Hoary cress*

*Johnson grass
Austrian field cress
Bindweed*

*Leafy spurge
Canada thistle
Quack grass*

All it takes is a sprinkling can and some inexpensive OLDBURY® sodium chlorate to rid any area of these and other bothersome weeds.

No expensive equipment. No costly chemicals. OLDBURY sodium chlorate costs only about 25¢ per hundred square feet of area.

Fast delivery • Hooker plants at Niagara Falls, N. Y. and Columbus, Miss., speed

sodium chlorate to you whenever you want it.

Technical help • Full-time Hooker agronomists are ready to help you with weed control plans and to advise you on handling, storing, and using sodium chlorate.

99% pure • You can get 99% pure OLDBURY sodium chlorate in 100- and

450-lb. steel drums. For prices and further shipping information, write to-day.

Railroad rights-of-way • Use the skilled services of specialists who apply formulations made with OLDBURY sodium chlorate.

Defoliating cotton • Other special formulations are available for this use, especially in irrigated areas.

For names and addresses of these
specialist firms, write us.

HOOKEER CHEMICAL CORPORATION

607 Buffalo Avenue, Niagara Falls, N. Y.



DUREZ® PLASTICS DIVISION • NORTH TONAWANDA, N. Y.
NIALK® CHEMICALS • NIAGARA FALLS, N. Y.
OLDBURY® CHEMICALS • NIAGARA FALLS, N. Y.

Sales Offices: Chicago, Ill.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; Worcester, Mass. In Canada: Hooker Chemicals Limited, North Vancouver, B. C.



GRASSHOPPER OUTBREAK

Federal-State Air-Ground Attack Organized

THE U. S. Department of Agriculture has completed joint Federal-State planning for an extensive ground and aerial spray program to combat the serious grasshopper outbreak infesting some 11 million acres in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

Bordering areas in southwestern Nebraska are scheduled for inclusion in the control program if grasshopper infestations develop there, the Department said.

Twenty-five pest-control specialists of USDA's Agricultural Research Service have been moved into the outbreak area during the past few days to assist some 22 department technicians previously working in this area with state officials.

USDA ground spraying equipment—high-velocity mistblower units—have been dispatched from adjacent areas to supplement state and county equipment in applying insecticides lethal to grasshoppers in localities heavily infested.

Plans have been completed for treatment by contract aircraft of more than a million acres—mainly range-land—in Texas, Oklahoma, and Colorado, under cooperative Federal-State-rancher agreements. In addition, small aircraft will be used to treat roadsides and idle and waste land in both Colorado and Kansas.

Secretary of Agriculture Ezra Taft Benson said this intensified

USDA effort is in line with President Eisenhower's request that the Department assist the Western States under its existing authority to control grasshopper infestations.

Following recommendations by the Secretary and the Federal Civil Defense Administrator, the President decided against declaration of the infested areas in eastern Colorado and western Kansas as major disaster areas under Public Law 875, which had been requested by the Governors of these two States.

USDA has available sufficient funds to pay one-third of the cost of needed insecticide treatments, as authorized under existing State-USDA agreements, on range, idle, and waste land. Under this formula, Federal funds are available in all areas where there is greatest local urgency for action, as represented by contributions to the program by local people.

To provide additional assistance in the affected areas, the Farmers Home Administration will advance credit to eligible farmers and ranchers to help defray the cost of spraying.

A State-by-State report on the situation and efforts being made to meet it follows:

In TEXAS, more than 4 million acres of range, idle, and waste land in 15 counties are affected. Control work has already been organized in Dallam, Hansford, Hartley, Hutchinson, Moore, Ochiltree, and Sherman counties, and will be organ-

ized in other counties as soon as possible.

Farmers are bearing the full cost of treating cultivated land. The State and counties are providing some ground equipment, furnishing all insecticides, and all personnel to complete the work on idle land and waste land. USDA is furnishing ground equipment, supervisory personnel, and one third of the cost of spraying roadside and range, waste, and idle land.

Rancher contributions are on deposit for treatment of more than 300,000 acres of range and idle land, and the ranchers have agreed to pay for two-thirds of the treatment needed on an additional 600,000 acres. Limited damage to the borders of wheat fields has occurred, but it is felt that this year's crop will be harvested before serious loss can occur.

In OKLAHOMA, grasshoppers are abundant on more than 1 million acres of range land, idle land, and waste land in 6 northwestern counties—Beaver, Cimarron, Ellis, Harper, Roger Mills, and Texas. Cooperative treatment is scheduled on 120,000 acres in Cimarron and Texas counties. Federal help is limited to one-third of the cost, with farmers, ranchers, and the counties bearing the other two-thirds. State field personnel are helping to organize the program.

In COLORADO, severe grasshopper conditions exist in six southeastern counties—Cheyenne, Kiowa, Kit Carson, Prowers, Yuma, and Washington. Populations range from 15 to 400 grasshoppers per square yard. Some of the hoppers have reached the adult stage. Less serious but important infestations are present in 10 other counties, which will also receive attention.

Plans are complete for treating about 360,000 acres of range land under the cooperative Federal-State-rancher spray program. State and Federal personnel are now in the affected counties organizing work on roadsides and idle land to protect crops. Insecticide treatments are already being applied in some areas.

In KANSAS, the main infestation involves an area about 3½ counties wide running from north to south in the western part of the State. Grasshoppers range

up to 250 per square yard. Some crop damage has been observed, but the infestation is still confined largely to roadsides and idle and waste land.

The organization of a cooperative Federal-State-county program is well underway. Plans have been completed to treat 125,000 acres of roadsides and idle land in 17 counties. About 25,000 miles of roadside spraying is involved in this effort. Plans for similar work are being made in 9 other counties.

Some control work on range lands may be needed in the northwest part of Kansas, with ranchers and the Federal Government sharing the cost under the prescribed formula.

In NEW MEXICO, only Union County is affected so far. About 160,000 acres are involved. Interest is developing among ranchers in a range-land control program. Various factors have combined to delay grasshopper development in this area, but conditions favor a complete hatch.

Extend Potash Pacts

Agreements have been reached among the Carlsbad, N. Mex., area potash companies and all but one of the operating unions on extending contracts involving more than 6,000 workers. The contracts expired last month.

Involved are the U. S. Potash Co., of America, Southwest Potash Co., Duval Potash and Sulphur Co., and International Minerals & Chemical Corp.. The extensions of the contracts varied in length from a week up to 60 days.

FMC Names Johnson

Dr. Oscar H. Johnson has been named director of research and development for the organic chemicals department of the Food Machinery and Chemical Corp., New York.

Dr. Johnson will direct the basic organic research programs for the newly formed department, comprising Niagara and the Chemicals & Plastics Division, at the FMC Central Research Laboratory. He joined FMC in 1946 and, prior to his new appointment, had been director of research for the Niagara Chemical Division.

At the same time, the company appointed Dr. Hans O. Kauffman director of research and development for the Inorganic Chemicals Department. He is responsible for research and development activities of the Becco Chemical Division, Westvaco Chlor-Alkali Division, and the Westvaco Mineral Products Division.

Named Advertising Manager



W. Scott James has been appointed advertising manager of the Chemagro Corp., Kansas City, Mo. He will continue to serve as eastern regional manager of Chemagro, with headquarters in New York.

Mr. James was sales manager of the Agricultural Chemicals division of the Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., before joining Chemagro in 1955.

Heads Quebec Fertilizers

P. E. Bastien, Quebec district sales manager of the fertilizer and feeds division of Canada Packers Ltd., Montreal, last month was elected chairman of Quebec Fertilizers, Inc., Le Gite, Que.

Other officers elected were: vice-president—George R. Blais, assistant Quebec district sales manager, agricultural chemicals division, Canadian Industries Limited; executive director—Ronald Olivier, general manager, William Houde Limited; secretary-treasurer—L. E. Whitworth, International Fertilizers Limited; agronomic committee chairman—Jean Leclerc, Canadian Industries Limited; advertising committee chairman—Réal Roy, Canada Packers Ltd.

Sees Bright Farm Future

C. D. Siverd, assistant general manager of the Agricultural Division, American Cyanamid Co., New York, told the Northeastern Association of State Departments of Agriculture that the tremendous economic boom the American farmer has been enjoying for the past decade is still rising and the end is nowhere in sight.

Speaking at the group's annual Spring meeting in Atlantic City, N. J., June 1 to 3, Mr. Siverd attrib-

uted the bright future for agriculture to more people with money who place greater emphasis on improved diets than they do on appliances, automobiles, and housing.

Georgia Farm Tours

The Georgia Plant Food Educational Society is conducting a series of summer meetings this month on farms of winners of awards for outstanding grazing and feed production programs. The meetings include short tours of the farms.

The meetings are being held in Zebulon, July 1; Albany, July 2; Commerce, July 9; and Statesboro, July 10.

Institute Elects Clegg

L. V. Clegg, production manager, agricultural chemicals division, Canadian Industries Ltd., Montreal, was one of 12 newly-elected councilors of the Chemical Institute of Canada, Toronto, at the group's 41st annual conference, May 26, in Toronto.

The council, consisting of 36 members, is the national policy-making body of the institute.

Eastern States To Build

The Eastern States Farmers Exchange, West Springfield, Mass., has broken ground at Detroit, Maine, for a fertilizer plant. The new plant, which is an expansion of existing operations, will employ about 20 persons.

Limestone and nitrogen will be obtained from Rockland and Searsport. Phosphate and potash will be imported from outside the state.

USI Fellowship At Rutgers

A fellowship has been provided at Rutgers University, New Brunswick, N. J., to study the role of ethanol in cellulose digestion of dairy cows by the U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., New York.

The U. S. I. fellowship will help Rutgers graduate students conduct experiments concerning the effect of a liquid feed supplement containing ethanol and urea nitrogen on the rate of fermentation in the rumen of cows. Dr. James L. Cason will supervise the experiment.

What we can do for you—

IN THE FIELD OF FERTILIZERS, INSECTICIDES, OR MATERIALS HANDLING



For 19 years we have followed the white line on just one road—solving engineering production and cost problems in the mixing, grinding and blending of almost any chemical. Pharmaceutical to pesticides. Elevating to bagging. This experience isn't worth anything to us or to you—unless you have a problem, or maybe you have a question to ask. We would like to get acquainted with you—just drop me a line or telephone. Talking is a pleasure and no obligation.

Al Poulsen

We design and build complete plants



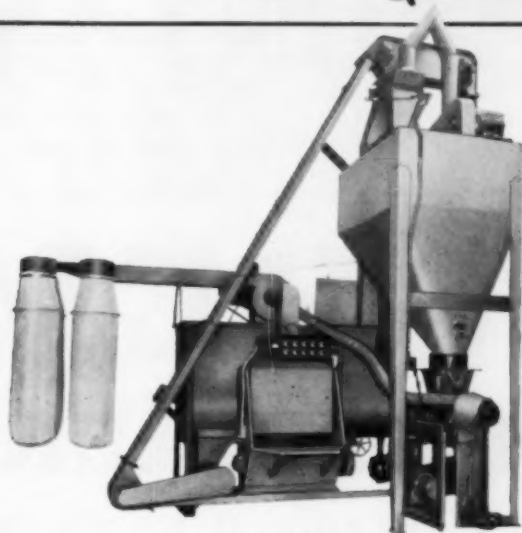
Insecticide plant in California—This is one of the many complete plants in this country and in South America built by the Poulsen Company.

If you want to redesign or relocate

There are lots of new ideas in the chemical mixing field. We can help you redesign or relocate to save space, to secure labor economy, to secure more flexibility, and to reduce other costs. Please ask us for specific examples.

If you need specially designed equipment

You have a special problem. Perhaps you have had it for some time, and this problem requires a special something-or-other to solve it. Tell us the problem. There always seems to be a solution.



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IF YOU MIX, GRIND, OR BLEND—

*R.T.R.**

**Uni-Blender
solves many problems**

That's what you want—a plant that's *Ready-To-Run—not a plant that requires long engineering, many components from many places, with unknown and untested installation and operating problems.

The Poulsen Uni-Blender is our standard unit. It does almost everything but wind the clock. It mixes, elevates, grinds, and bags. Impregnates liquids with diluent mixes.

If your product deteriorates from long delays in shipping, you want to deliver a *fresh* product...the Uni-Blender can do it!

If you want to blend concentrate to field strength...if you would like to switch from custom-mixed to standard...Uni-Blender can do it!

This unit can handle six to eight, 1200 to 1500 lb. batches of field strength dust per hour. Other capacities are available.

Requires only 9' by 12' floor space and 16' headroom. Factory pre-tested and ready to go to work for you just two days after delivery. Let's talk about it.



Engineers and manufacturers
of materials processing
and materials handling equipment

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Los Angeles 21, California

GENTLEMEN: Please send me your technical bulletin about the standard unit Uni-Blender.

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COMPANY _____
ADDRESS _____
CITY _____ STATE _____

Miller Buys Ramsburg Plant

Miller Chemical and Fertilizer Corp., Baltimore, has purchased the Ramsburg Fertilizer factory in Frederick, Maryland, and plans to begin manufacturing of its complete line at the new facility this month.

Available from the Frederick location will be Miller bagged and bulk fertilizers, liquid fertilizers, insecticides, and agricultural chemicals. Sale of Miller products, as well as soil testing, insect counts and general customer servicing from the Frederick

location will be handled by Garry W. Bell, district manager in charge of sales and production, and by Clayton P. Hackman. Other Miller plants are located at Baltimore, Maryland, Whitford and Salisbury, Maryland, and at Hanover and Ephrata, Pennsylvania.

North Central Weed Meeting

The North Central Weed Control Conference will hold its 15th annual meeting at the Netherland Hilton Hotel, Cincinnati, Dec. 3-4.

AGREM EMULSIFIERS for insecticides & herbicides

All purpose single emulsifiers: AGREM 500, AGREM 600. Either of these emulsifiers can be used to give flash dispersion and excellent stability to formulations containing chlorinated hydrocarbon toxicants in a wide variety of solvents.

Specific phosphate insecticide emulsifiers: AGREM MP and M, AGREM P, AGREM Q. These emulsifiers are specifically suited to the formulation of Malathion, Parathion and Methyl Parathion.

All purpose twin emulsifiers: AGREM 102 and AGREM 103, AGREM 217 and AGREM 221. These emulsifiers, when blended properly, can be used to produce excellent concentrates containing the chlorinated pesticides and all herbicide esters.

Write today for data, samples and prices!

THEODORE RIEDEBURG ASSOCIATES

415 Lexington Ave.

New York 17, N. Y.

Murray Hill 7-1488

To Build Eighth Plant

Southern States Cooperative, Richmond, Va., will build a \$750,000 granular fertilizer plant, near Russellville, Ky., with an annual capacity of 60,000 tons. The facility will be the co-op's eighth plant and its first for the production of granular fertilizer.

The plant will be highly mechanized and, except for a headhouse to accommodate elevators and machinery, will be one story high. Storage tanks will be included for 60,000 gallons of liquid materials. Other storage space will hold 10,000 tons of mixed fertilizer and materials and still another storage building will be large enough to hold 500 tons of bagged materials.

One mixing mill and two bagging mills will turn out the plant's mixed goods. The first mixed fertilizer is expected to be shipped out in the Spring of 1959. Facilities will be provided for manufacturing normal grade granular fertilizer as well as extremely high analysis. Regular pulverized fertilizer also will be produced and fertilizer in bulk will be available from the plant.

Named Borden Vice President

Eugene J. Sullivan has been appointed executive vice president of the Borden Chemical Co., New York. Mr. Sullivan had been vice president in charge of sales for Borden since January, 1957. He joined the company in 1946.

As executive vice president, he succeeds H. H. Clark Jr., who resigned to become president of the Dyna-Therm Chemical Co.

Joins Inorganic Division

Anselm B. Bradley has joined the sales department of the Monsanto Chemical Co.'s Inorganic Chemicals Division at So. Louis. He had been with the company's Lion Oil Co. Division since 1956.

New Geigy Representative

Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N. Y., has named Norman D. Thomsen as sales representative in the upper north central states.

AGRICULTURAL CHEMICALS

For uniformly conditioned
mixed goods, use

Du Pont UAL-S

Here's how it works...

New Du Pont UAL-S permits you to take advantage of the well-known conditioning effect of sulfates in fertilizers. A small amount of ammonium sulfate added in a finely dispersed form as in UAL-S is equivalent to a much larger amount added dry to the mixture... ammonium sulfate means better, more uniform conditioning. All of your fertilizers will benefit from nitrogen derived from UAL-S, because it combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur... an essential plant nutrient with recognized agronomic value.

Regular mixtures cure well with UAL-S,

are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well. UAL-S is non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum, and it's safe—handles at moderate pressure, and there's no danger of flash fires.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, fill out and mail the coupon.

PROPERTIES OF UAL-S

Nitrogen Content	42.5%	Composition: Parts/100	
Freezing Point	20°F.	Urea	38.8
Pressure	15 psi at 60°F.	Ammonium Sulfate	10
Specific Gravity	1.13	Ammonia	27.1
Fixed to Free Ratio	.9 to 1.0	Water	15.1
		CO ₂	9.0

*Du Pont UAL solutions in mixed fertilizers have helped
American farmers grow better crops for 25 years.*

URAMON®

AMMONIA LIQUORS



BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Department, Room 2539-W
Wilmington 98, Delaware

Dear Sirs: Please send me more information on UAL-S.

Name _____
Firm _____
Address _____
City _____ State _____

Announcing the Revolutionary

Raymond Rotomatic Packer



Here is the machine that is changing all standards for accurately weighing and packing free-flowing materials in open-mouth multi-wall bags!

The Raymond Rotomatic Packer is fully automatic, all-mechanical, and requires no outside source of

power such as electricity or compressed air. It combines gravity operation with the even balance scale principle that delivers simplicity of operation, accurate weights, and high rate of production.

**New
Design
New
Principle**

- Gravity Operated
- No electricity or compressed air
- Speed plus Accuracy
- Lowest Maintenance

Practical bagging rates are limited only by the operator's ability to feed bags to the filling tube. The Raymond Rotomatic Packer handles 50 lb. bags up to 100 lb. bags with equal ease. Bag size changes take less than 60 seconds and the first new size bag is correctly weighed.

Practical variances in material density do not affect the accuracy or operation of the Raymond Rotomatic Packer. The machine design limits material in suspension to a minimum, further im-

proving weight accuracy.

No specialists are required to maintain and service the Raymond Rotomatic Packer. Scale assembly can be adjusted by regular scale mechanics and any competent mechanic can service the unit.

Engineering, operation, and installation details are available from any Raymond Representative. For more details and information, write or call the Raymond Office nearest you.



SALES OFFICES

Middletown • Richmond • New York • Chicago • Minneapolis
Denver • St. Louis • Kansas City • Detroit • Charlotte • Memphis
Philadelphia • Baltimore • Houston
Cleveland • East Aurora, N.Y. • Louisville • Orlando

Raymond

BAG CORPORATION

a division of Albemarle Paper Mfg. Co.
Middletown, Ohio

Named NPFI Representative

Arlan Woltemath has been named a district representative of the National Plant Food Institute. He is attached to the NPFI's Midwest regional office in Chicago and works out of Kansas City, Mo.

Mr. Woltemath, who had been a district agronomist for the Spencer Chemical Co., Kansas City, since 1955, will work in the states of Missouri, Kansas, Nebraska, and Iowa.

Eagle-Picher Sales Meeting

Representatives of the Celatom Products Department of the Eagle-Picher Co., Cincinnati, held a nine-day combination sales meeting, product information seminar, field trip, and plant inspection tour last month, beginning June 7.

The meetings were held at the original Eagle-Picher Celatom operation at Clark, Nevada, and at a new facility nearing completion at Colorado, Nevada.

Keays Joins Crag Staff

The Union Carbide Chemicals Co., Division of Union Carbide Corp., has appointed John W. Keays to the Crag Agricultural Chemicals Department at White Plains, N. Y.

Mr. Keays is a member of the department's newly-formed Product Development Group and will assist in the market development of Crag Sevin insecticide. He formerly was located at the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., where he assisted in laboratory and field evaluations of Sevin.

Germany To Set Tolerances

Legislation will come before the present session of the West German Parliament with the aim of setting up tolerances for the use of residual insecticides.

Because of this, there is some belief that Germany's imports of pyrethrum will increase considerably and possibly double the rate of 360,000 pounds of extract imported in the first quarter of this year. The German sales agents for the African pyrethrum interests are being backed by a \$20,000 advertising and publicity campaign. Initially, the campaign will

be aimed at the bulk buying trade and will be followed by a campaign directed to insecticide manufacturers and then the general public.

Joins Utah Office

Philip A. Sawyer, assistant manager of agricultural sales, Southwest territory, for Wilson & Geo. Meyer Co., in Los Angeles, has been transferred to Salt Lake City, Utah, where he is assistant sales manager of Wilson & Geo. Meyer & Co. Intermountain, a Meyer affiliate.

Address Training Session

Two representatives of the fertilizer industry were guest speakers at a recent training session for multi-wall bag salesmen of the Union Bag-Camp Paper Corp., New York.

They were J. B. Lynch, general purchasing agent for Smith-Douglass Co., Inc., Norfolk, Va., and R. A. Garn, manager of the chemical processing division, Farm Bureau Cooperative Association, Inc., Columbus, Ohio.



**NO MATTER
WHAT SIZE
OPERATION
YOU HAVE . . .**



**THERE'S A BLUE VALLEY
GRANULATION UNIT ENGINEERED
FOR YOUR PLANT!**

Blue Valley units incorporate economy and operating flexibility along with the capacity and quality production you desire. So, when considering granulation, think first of Blue Valley . . . the company with more units operating than any other. Write, wire, or call . . .



**BLUE VALLEY EQUIPMENT MFG.
AND ENGINEERING CO.**

LAURENT & N. TAYLOR
TOPEKA, KANSAS
PHONE Central 4-3441

it's...

magnesia for greater yields

Year after year Berkshire's EMJEO® (80-82% Magnesium Sulphate) and Calcined Brucite (fertilizer grade) 65% MgO have proved to be invaluable primary plant foods—together with nitrogen, phosphorous, and potash.

it's...

BERKSHIRE for highest quality magnesia

Be sure to include Berkshire's EMJEO and/or Calcined Brucite (fertilizer grade) 65% MgO in your mixtures as sources of available magnesium. You'll be glad you did.

and

it's...

BERKSHIRE'S POTNIT*

(94/95% Nitrate of Potash) for special mixtures and soluble fertilizers.

*Trademarks Reg. U.S. Pat. Off.

Berkshire Chemicals

INC.

420 Lexington Ave.,
New York 17, N. Y.

Sales Offices: New York
Chicago • Philadelphia
Cleveland • Boston • Pittsburgh
San Francisco

BREVITIES

THE OHIO PESTICIDE INSTITUTE's summer field tour will be held at the Ohio Agricultural Experiment Station, Wooster, Ohio, on August 12 and 13.

AC

W. F. BLISS JR. has been appointed technical sales representative at Houston, Texas for the Geigy Industrial Chemicals division of Geigy Chemical Corp., Ardsley, N. Y.

AC

THE MICHIGAN CHEMICAL CORP., Saint Louis, Mich., has appointed David L. Coleman to its chemical sales staff. Previously, Mr. Coleman had been with the Olin Mathieson Chemical Corp. and the Hooker Electrochemical Co.

AC

WILLIAM ROESCHEN has been appointed chief engineer of the Highway Equipment Co., Cedar Rapids, Iowa. He had been a sales engineer for the Arrow Manufacturing Co., Denver Colo.

AC

RAY S. DUNHAM, a teacher of agronomy and a weed control specialist, has retired after 37 years on the University of Minnesota staff.

AC

THOMAS E. MILLIMAN was honored by fellow executives of the Co-operative G.L.F. Exchange at a luncheon in Ithaca, N. Y., May 26. He was presented with an ironwork weathervane and a citation which called him one of the "few with the courage and competence to provoke significant change." Mr. Milliman has been with G.L.F. for 30 years.

AC

DAVID A. DOUGLAS, a co-founder of the Warren-Douglas Chemical Co. of Omaha, Nebr., Des Moines, Iowa, and Sioux City, Iowa, died suddenly on May 31st of a heart attack. Mr. Douglas helped to start his company

in 1945 and had been active in the business ever since. He was 57.

AC

KENNETH E. WALKER has been named director of the Michigan Chemical Corp.'s new division of planning and cost control. He previously was manager of corporate planning and analysis for Norden-Ketay Corp., Stamford, Conn.

AC

C. F. LANE has been named division acid superintendent, Southern Division, American Agricultural Chemical Co., New York.

AC

THE BEMIS BRO. BAG CO., St. Louis, has announced the appointment of W. D. Stohlman, manager of the Norfolk bag factory and sales division, as Midwestern representative of the Bemis Cotton Department. L. H. Goff Jr. has succeeded Mr. Stohlman as manager at Norfolk.

AC

THE COLUMBIA-SOUTHERN CHEMICAL CORP., Pittsburgh, has announced that Dr. Hans Jorg Wartmann of Zurich Switzerland and Roy E. Stack have joined the firm's Barberton, Ohio, research laboratory as research chemist and chemist, respectively.

AC

HOMER H. HAZELTON has been named Pacific Northwest representative for the Richardson Scale Co., Clifton, N. J. Mr. Hazelton's territory consists of Oregon, Washington, and Idaho.

AC

RALPH K. GOTTSHALL, president of the Atlas Powder Co., Wilmington, Del., formally dedicated the firm's new technical center on May 23. The center, located next to the company's general offices, houses basic research and chemical product development activities.

AGRICULTURAL CHEMICALS

LAMAR M. FEARING, vice president and assistant general sales manager, International Paper Co., New York, has been named vice president with general administrative responsibilities within the company. Wallace K. Graves has succeeded Mr. Fearing as assistant general sales manager and Larrance E. Graham has been named division sales manager to succeed Mr. Graves.

AC

JOSEPH J. LAPUTKA has been appointed treasurer of the Escambia Chemical Corp., New York. He joined Escambia last year as assistant treasurer.

AC

ROBERT L. SHERRILL has been named to the general sales staff of the Raymond Bag Corp., Middletown, Ohio. He had previously spent 15 years each with the Bemis Bag Co. and the Union Bag and Paper Corp.

AC

ANSUL CHEMICAL CO., Marinette, Wisc., has declared a second quarter cash dividend of 25 cents per share. This will be the 104th consecutive quarterly dividend issued to company stockholders.

AC

THE 6TH ANNUAL ILLINOIS Summer Orchard Day will be held at the Gem City Vineland Co. orchard at Nauvoo, Ill., on July 16.

AC

JAMES G. HORSFALL, Director of the Connecticut Agricultural Experiment Station since 1948, received an honorary Doctor of Science degree from the University of Vermont, Burlington, on June 15.

AC

GEORGE J. URBANIS has been appointed district sales manager for the Phosphate Chemicals Division of the International Minerals & Chemical Corp., Chicago. He is in charge of a territory extending into New England, the Mid-Atlantic states, Ohio, and Canada.

AC

ODELL GODWIN has joined the Hayes-Sammons Chemical Co., Mission, Texas, as credit manager. For the past 15 years, Mr. Godwin has

been associated with agriculture and citriculture operations in the Rio Grande Valley.

AC

THE NATIONAL PLANT FOOD INSTITUTE has announced that it has made grants to the University of Missouri and the Kentucky Agricultural Experiment Station. The grants will help support pasture fertilization demonstrations and studies to determine the optimum time to apply fertilizers to grass-legume mixtures and to small grains.

W. E. SCOTT, New York district sales manager of the International Paper Co.'s Bagpak Division, died last month after a short illness. He was 66 years old.

AC

HEMEON ASSOCIATES, Pittsburgh, Pa., has prepared a brochure describing the firm's development of an odor-metering apparatus and techniques for its application to odor-control problems. The brochure is available from the company at 121 Meyran Ave., Pittsburgh 13.

► Ammoniators*

► Granulators*

► Conveyors

► Elevators

► Coolers

► Dryers

*TVA Licensed Manufacturers

**FOR THE
FERTILIZER
INDUSTRY**



A Renneburg Continuous Combination Ammoniator-Granulator, a Renneburg DehydrO-Mat Dryer with special refractoryless gas-fired furnace, and a Renneburg Straight Shell Cooler... being installed in a 30-ton-per-hour granular plant of one of the leading mid-western fertilizer producers.

**RENNEBURG
CONTINUOUS COMBINATION
AMMONIATOR-GRANULATOR**

This rugged and highly-versatile unit is being used for government research work and experimentation in plant size quantities.

Other chemical and fertilizer processing equipment manufactured by Renneburg includes: • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

Write for Free informative bulletin: "Renneburg Continuous Granular Fertilizer Equipment"

Edw. Renneburg & Sons Co.

2639 BOSTON STREET • BALTIMORE 24, MD.

Pioneers in the Manufacture and Development of Processing Equipment for over 80 years.

Equipment, Supplies, Bulletins

New Nopco Emulsifier

The Nopco Chemical Co., Harrison, N. J., has released information on an improved emulsifier for agricultural toxicants. Called Agrimul TL, the product is a liquid blend of nonionic and anionic surfactants which is soluble in water and xylene and dispersible in kerosene.

Agrimul TL gives instant emulsions with almost no creaming or oiling out, even under fairly extreme conditions. Further details are available from the company's Insecticide Chemicals Division.

Anhydrous Ammonia Bulletin

The Sun Oil Co., Philadelphia, is offering a technical bulletin on commercial and refrigeration grades of

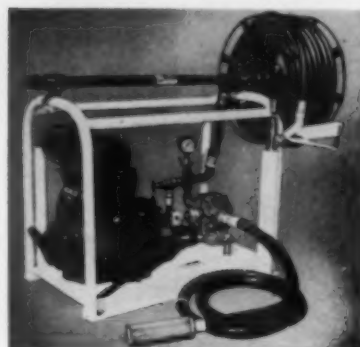
anhydrous ammonia. The bulletin contains information on physical-chemical properties, specifications, and Sun's shipping and service facilities. Copies are available from the company's Industrial Products Department, 1608 Walnut Street, Philadelphia 3.

Prefabricated Steel Tank

A prefabricated galvanized steel tank that holds more than two hopper bottom rail cars of any free-flowing dry granular material is being offered by the Butler Manufacturing Co., Kansas City, Mo.

The new tank is 12-feet in diameter with a center draw-off hopper and provides up to 80 tons of self-unloading bulk storage for processing plants and distribution depots.

Tryco F-100 Pump-Engine



The Tryco Manufacturing Co., Decatur, Ill., is offering a new Model F-100 pump-engine unit designed especially for the rapid application of heavier-than-air grain fumigant materials in flat or round storage buildings.

The high volume, vane type pump delivers up to 19 gallons per minute, and is equipped with special packing that will withstand the penetrating action of grain fumigants.

Velsicol "Emmi" Booklet

An information manual listing information and test data on Velsicol's new eradivative and protective fungicide, "Emmi," has been prepared by the company.

At present, the chemical is produced only as an emulsifiable concentrate. Chemically it is N-ethylmercuri-1,2,3,6-tetrahydro-3,6-endomethano-3,4,5,6,7,7-hexachlorophthalimide. It has been used commercially for several years as a protective dip for gladiolus corms. Emmi is expected to have application as a seed treatment for small grains and cucurbits and as a foliar spray for pecans. The booklet is available from Velsicol Chemical Corp., 330 East Grand Ave., Chicago 11, Ill.

Reinforced Plastic Tanks

Jones & Hunt, Inc., Gloucester, Mass., is offering fiberglass plastic tanks that are said to have a strength to weight ratio in compression and tension greater than steel.

Sizes of the tanks range from 110 gallons to 4,000 gallons. For their construction, the most chemically inert polyester resins are used and reinforced with about 40 per cent woven glass roving and mat. A brochure giving full information on the tanks is available from the company at 16 Emerson Avenue, Gloucester.

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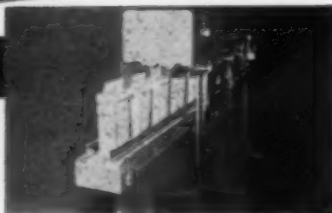
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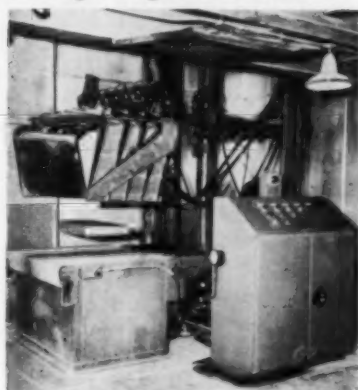
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St. Regis Bag Tester



An automatic flat drop testing machine, that is said to make it possible to test filled multiwall bags faster and more accurately than the free-falling rate testers now in general use, has been developed by the St. Regis Paper Co., New York.

Electrically and hydraulically powered, the new machine is operated by setting the dials on a control panel to determine the height and pattern of drops in a test series. The average rate of testing is two bag drops per minute. Bags can be dropped from the same height over and over or drop height can be increased each time in increments of six inches. The number of drops made in a test series is indicated on the control panel.

The machine is automatic and all handling is done mechanically until breakage has been detected and the bag is taken off the machine. This eliminates the incidental damage that can be caused by repeated manual handling after each drop in a test series, and minimizes operator fatigue.

New Metering Pumps

A newly designed series of continuous-duty metering pumps that transfer liquids and gases through plastic or rubber tubing at exceptionally slow rates and with pre-determined accuracy are being produced by the New Brunswick Scientific Co., New Brunswick, N. J.

Precision control and an ability to operate under sterile conditions, plus the range of flow rate of these compact units, are said to make them ideally suitable as research tools. Complete information and specifications on the pumps are available from the company at P.O. Box 606, New Brunswick.

Yale Inverter Attachment

A lift truck attachment designed to invert containers of liquid in storage to prevent "settling out" has been developed by the Yale Materials

Handling Division, The Yale & Towne Manufacturing Co., Philadelphia.

The attachment uses two pairs of hydraulically operated forks, the lower pair fitting into the pallet on which the containers are stored and the upper pair bringing an empty pallet down on top of the load to hold it securely in place. With the load thus secured, the attachment rotates 180 degrees to position the containers upside down on the second pallet.

Gravimetric Feeders Booklet

Simplex or duplex gravimetric feeders for liquids or solids are discussed in a new eight-page, three-color bulletin issued by Omega Machine Co., a division of B-I-F Industries, Inc., Providence, R. I.

The bulletin provides explanatory text, dimensional drawings and tables, photographs, schematic drawings, and performance charts. The bulletin, No. 32-R2, is available from the company at 345 Harris Avenue, Providence 1.



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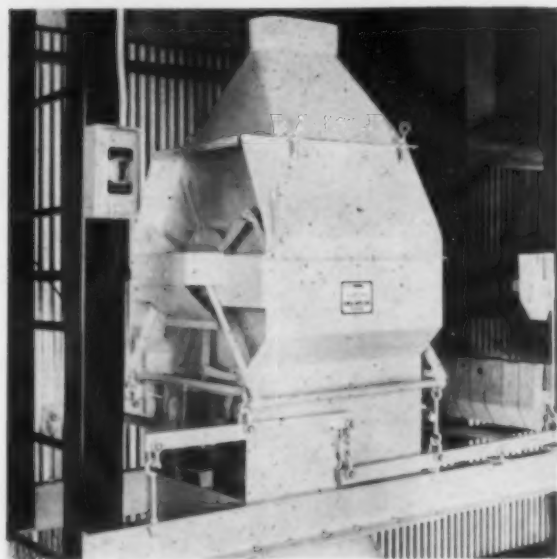
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Raymond Mechanical Open-Mouth Packer



The fully-automatic open-mouth packer requires no outside source of power and may be suspended in an overhead position or mounted on legs, as shown. Operated by gravity, the machine is simple to operate and service.

RAYMOND Bag Corp., Middletown, Ohio, has introduced a fully-automatic, all mechanical open-mouth packer that requires no outside source of power such as electricity or compressed air.

The weight of the material being weighed operates the Raymond Rotomatic Packer by a gravity principle. The machine is said to combine its simplicity of operation with accurate weights and a high rate of production.

The design of the machine utilizes an even balance scale principle, the accuracy of which is not affected by the density of the material being packed. The machine limits material in suspension to a minimum, which means that the hopper supply is cut off at the exact moment the desired weight is reached.

A rotary hopper, suspended by the scales, is located directly beneath the valve. When the hopper is filled to the desired weight, the valve is closed. Because of the closeness of the pile to the valve, the material in suspension when the valve closes is cut to a minimum. This means very little guess weighing is necessary.

Under ideal conditions, the Raymond Rotomatic Packer, using dense material, is capable of cycling at the rate of 45-100 pound units per minute and accurate weights are unaffected by the speed of operation. The

machine will pack standard 50 to 100 pound multiwalls with equal ease.

Among the machine's characteristics are an absence of feed belts, electrical solenoids, and air valves. All bearings are outside the machine and are dust-proofed, oiled, and sealed for life. In addition, the packer does not require a continuous flow of material to the machine for accuracy.

It is constructed of heavy-gauge, high-carbon steel and all parts are interchangeable on any specific model.

Shell Develops Neutralizer

The Shell Development Co., New York, has announced that its scientists have found means of preventing decomposition and spontaneous combustion of dry chlorinated insecticide formulations.

The Shell scientists claim that such trouble is caused by clay particles that are used in the manufacture of dusts and wettable powders. This finding led to the development of neutralizing agents that are said to effectively prevent decomposition and combustion. Shell research showed that the clay particles act as catalysts, accelerating decomposition of the formulations.

To neutralize the acidity of the clay particles, chemicals used include urea and hexamethylenetetramine.

FERTILIZING BY AIR

(From Page 47)

over the 27-foot swath width. The plane carries a 750-pound load.

Also the spreader must be big so that it isn't crowded and can be positively shut-off at the end of the field. Farmers don't like to see the fertilizer for which they are paying trailed off into their neighbors' fields, Mr. Hinman said.

Mr. Hinman's spreader was built for him by Simpson and Whitney Aircraft of Liberal, Kans. He says he knows of only one company building a suitable spreader for fertilizer, and it is in California and is building spreaders for Stearman planes. Mr. Hinman does not know of any factory spreader built for smaller planes.

Although not common in Kansas, heavy aerial application of fertilizer is well-known and practiced in California, Mr. Hinman says. He worked in California in 1950, '51 and '52 and brought back to Kansas the ideas for establishing his own aerial fertilizer service.

Mr. Hinman has been an aerial applicator for the past ten years and has operated Bee's Airline at Plains for the past five years. He customarily keeps two aircraft in operation during a season, selling them at the end of the season and re-equipping before the next season.

He started pushing the aerial fertilizing as a supplemental operation to keep his expensive equipment busy after the soil bank and allotment programs cut deeply into the aerial application business in this area.

Herbicide application still leads his volume, with insecticides ranking next, but Mr. Hinman believes the business of aerial application of fertilizer will grow steadily, as farmers come to realize that its cost doesn't compare unfavorably with the high cost of ground application and the maintaining of ground equipment.

To date this season his ratio of work has been about 80 per cent on irrigated wheat and 20 per cent on dry land wheat. Mr. Hinson points out that during a wet season when

fields are soggy he can operate with no difficulty while tractor-drawn spreaders will bog down.★★

NPFI REPORT

(From Page 29)

decision point. The weakest link in the chain of information which comes to the farmer about fertilizer usage from college experiment stations through the local county agent is at the decision point—the point where the farmer decides what kind and how much fertilizer to apply to each of his fields."

Most farmers, he said, never have the opportunity to consult the local county agent when fertilizer decisions are made."

Mr. Clark said that "the educator who believes that the average working farmer is going to make correct decisions about fertilizers, insecticides, weedicides, machinery, book-keeping, medication, animal husbandry, and farm mechanics is a Pollyanna in a daisy patch," adding that "because he can't know everything about everything, today's farmer depends upon other people to help him make a lot of decisions."

A Banker's Thoughts . . .

As an example of confidence in the industry, Harry E. Rash, president of The First National Bank, Thayer, Kans., stated that his bank has "never refused to make a fertilizer loan" and "never had a loss on a fertilizer loan."

"In 1954, we hired the first farm representative in our area," Mr. Rash said. "We felt that with the change in agriculture our farmer-customers needed assistance in planning proper management programs. We regard a sound fertilizer program as one of the most constructive in which our customers can engage. The use of fertilizer brings the additional net income so important to successful operations."

Business and Awards

A FEATURE of the 3-day meeting was the presentation of NPFI awards for "superior journalistic contributions toward the building of soils of our nation." Paul D.

Sanders, editor of *The Southern Planter* and Berry H. Akers, Editor-in-chief of *The Farmer* were presented the awards by Dr. Russell Coleman, executive vice president of the National Plant Food Institute.

At a business session an amendment to the by-laws was passed clarifying the dues structure. The amendment defines the term, broker, straightens out the dues basis when subsidiaries are jointly owned by more than one parent company and clarifies the exemption of intercompany transactions from dues liability.

Twelve new members were elected to the Board of Directors for terms expiring in June 1961. They are: J. H. Epting, Epting Distributing Co., Leesville, S. C.; G. R. Monkhouse, Shell Chemical Corp., San Francisco; Jacob White, Allied Chemical Corp., New York, N. Y.; R. E. Bennett, Farm Fertilizers, Inc., Omaha, S. L. Nevins, Olin Mathieson Chemical Corp., Little Rock; W. H. Wilson, Virginia-Carolina Chemical Corp., Richmond; R. C. Wells, National Potash Co., New York, N. Y.; Rene A. Jones, The Anaconda Co., Anaconda, Montana; J. D. Stewart, Jr., Federal Chemical Co., Louisville; W. E. Shelburne, Armour Fertilizer Works, Atlanta; E. N. Carvel, Valliant Fertilizer Co., Laurel, Del.; Wallace B. Hicks, Wilson & Toomer Fertilizer Co., Jacksonville, Fla.

Members of the executive committee elected by the NPFI Board are: J. L. Christian, Monsanto Chemical Co., St. Louis; R. B. Douglas, Smith-Douglass Co., Norfolk, Va.; D. R. Gidney, U. S. Potash Co., New York; H. A. Parker, Sylacauga, Fertilizer Co., Sylacauga, Ala.; S. S. Learned, Phillips Petroleum Co., Bartlesville, Okla.; W. E. Shelburne, Armour Fertilizer Works, Atlanta; W. H. Wilson, Virginia-Carolina Chemical Corp., Richmond, Va.; and the newly elected president, R. Bennett; and newly elected Chairman of the Board, D. George.

Victor A. Ericson was elected to fill the unexpired term of W. E. Mee-ken, both of Consolidated Rendering Co., Boston; and J. C. Crissey, GLF, was elected to fill the unexpired term of W. T. Steele, Jr. of Richmond.

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To the packages of fertilizer and plant food designed for private lawns and gardens, house plants and commercial greenhouses, a new dimension has recently been added in the form of "aromatics". The home gardener who for years has assumed that the unpleasant odor emanating from the package or resulting from the product's wetting, was a necessary evil, is being re-educated to the era of fertilizer aromatics by a number of enterprising producers. In the D&O Industrial Odorant Laboratories, masking and reodorizing compounds have been developed for all types of commercial fertilizer, including those based on urea, fish solubles, activated sludge, dried blood meal, animal manure, tankage, meat scraps and phosphate. The successful development of such fertilizer odorants has provided an important new merchandising tool to producers... a tool that can be put to work now, for your product by the D&O industrial perfumer. Inquiries are invited.

Write for copy of article entitled "Aromatics in the Fertilizer Industry".

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ORVILLE C. COMPTON, an engineer for the American Agricultural Chemical Co. in Carteret, N. J., for many years, died last month after a short illness. His age was 83. He retired in 1943.

AC

FOREST PROTECTION Ltd., has informed the New Brunswick legislature's forestry committee that 12 Grumman Avengers, former Navy torpedo bombers, will be used for the 1958 forest insecticide spraying program.

ILLINOIS SCHOOL

(From Page 45)

THE success of the spray schools depends on many things. As mentioned above, spray operators consider good topics and speakers, the summary of presentations, and the fact that the school is run on schedule, as most important.

This is how the topics are selected.

Several months before a spray school is scheduled, a notice is sent to all persons who have attended previous spray schools. This notice requests that the person send to Dr. Petty the topics they would like discussed. These requests are tabulated, and the most popular ones are selected.

In addition, the "topic selection committee" chooses topics of future interest. An example would be a new chemical schedule for release within a year or two. Thus when a new chemical is available, spray operators have some knowledge about it.

Speaker selection depends mainly on topic selection. That is, speakers are selected for their ability to speak on the selected topics. And if a qualified speaker cannot be found, the topic is dropped from the program.

During the actual presentations of topics, different speakers are scheduled at frequent intervals. This prevents monotony and boredom caused by one person speaking a long time. Speakers also try to condense their talks and make them as "sharp" as possible.

The abstract, or summary made of each talk before the school begins is still another important feature. The abstracts make it unnecessary for the audience to take notes during talks.

The spray operators or audience, is another important consideration in the school success. They feel that they are guests of the school and that their trip to the campus is worthwhile.

In order to cater to the spray school "guests," the first session of the two-day meeting does not begin until 10 a.m. This gives plenty of time to people who have a long distance to drive. For the people already on campus, films are shown until the school begins. These films, produced by the U.S.D.A., various industries and colleges, feature entertainment and education. An example would be a new film on weed control.

Another important ingredient is the audience-speaker relationship. Spray operators leave the school with the feeling that speakers appreciated their coming.

Little ingredients also go a long way in making the schools successful. Two examples are coffee breaks and a separate room where "bull" sessions can be held without disturbing others.

The combination of all the above ingredients helps to make the Illinois Custom Spray Operators School a success year after year.★★

FERTILIZER DEMOS

(From Page 57)

unfertilized, while the other four are fertilized and on which good cultural practices are carried out. Wheat yields are measured and the value of the fertilizer is demonstrated in a convincing way. This is the third year for this youth program, with approximately 100 boys taking part the past year. He hopes to have 200 next year. Fertilizer people supply all materials, and cash grants are provided by the National Plant Food Institute and the American Potash Institute.

Still another incentive for more emphasis on the fertilizer demonstration program is an award to the

county agent in Oklahoma who does the best job during the year in conducting fertilizer demonstration work. The award consists of an expense-paid trip to the national county agents' convention. Called the Myrl Gray award, in honor of a deceased county agent who helped set up the contest, it went last year to Alton Perry, Garvin county agent at Pauls Valley, Oklahoma. The award is sponsored by the Oklahoma Plant Food Educational Society.

Soil testing laboratories are located in all 77 county agent offices of the state, and have helped considerably in spreading the fertilizer demonstration program.

A survey is now being conducted in 35 counties of the state, with random samples being taken from 75 farmers in each county in an effort to find out how to further improve the educational program, and also why farmers don't use more fertilizer.★

SPRAY DAMAGE

(From Page 49)

Grew and his man say absolutely no DDT was drifted onto the pasture, and the direction of the wind would bear this out. I have been applying agricultural chemicals for ten years as owner and operator of Danforth Aerial Sprayers, and this job was no different than hundreds done in the past. It was performed in a careful and diligent manner.

BIOLOGICAL CONTROL

(From Page 32)

the control of the spotted alfalfa aphid in California (25) is an outstanding example of how proper selection, dosage, and use of chemicals can make biological control effective. In most of California, native predators, introduced parasites, and entomogenous fungi now keep the spotted alfalfa aphid populations below the economic threshold for most of the year. The use of non-selective treatments wipes out the parasites and predators, the aphid increases rapidly, and repeated chemical treatments are then necessary to achieve control. In some instances, this has hastened the development of resistant strains of aphids. On

the other hand, the use of a selective insecticide (in this case, demeton) throws the balance back in favor of the natural enemies.

Insect problems in field crops such as alfalfa appear to be particularly suited to the development of a compatible control program. It will be more difficult to establish a successful compatible program where there are several major insect pests present and particularly where each requires a different chemical control measure. In other cases, problems are created by control measures applied to other crops in adjacent fields. Michelbacher and Hitchcock (13, 14) have reported induced increases in frosted scale populations in walnut orchards following destruction of natural enemies by drift of DDT dust from nearby corn fields. A similar situation has been observed in olive groves by C. B. Huffaker where the drift of insecticides from cotton and alfalfa fields has upset biological control of the olive scale.

Chemicals other than insecticides may be the factor disrupting biological

control. Lord has achieved control of oystershell scale simply by changing the fungicide used in the spray program (10). In other instances, changing the timing of a non-selective chemical control had the same effect as a physiologically selective material (4, 8, 11, 15).

Non-selective materials, especially those with a short or no residual action, can be utilized in a compatible control program in special instances. The supervised control program for the alfalfa caterpillar in California depended upon a non-selective insecticide. Under this system, population levels of both the host caterpillar and its parasite are determined at appropriate intervals in all fields. A prediction of possible damage is made on the basis of these population levels, and only those infestations which are potentially economic are treated. In this way, on an area wide basis, the balance is thrown in favor of the parasites, even though a few parasites are destroyed in the treated fields. The success of such programs will depend on the exact nature of the

local problem and the quality of supervision. The rates of dispersal of parasites, predators and pests will also be a complicating factor.

The ideal selective material is not one that eliminates all individuals of the pest species and leaves all of the beneficial species. Use of such a material would force the predators and parasites to leave the treated area or starve to death. The ideal selective material is one which throws the balance back in favor of the natural enemies (1, 18, 30).

In conclusion, we should like to emphasize that the development of compatible control programs is not a panacea that can be applied blindly to all situations, for it will not work if natural controls are inadequate. However, it has worked so well in some situations that there can be no doubt as to its enormous advantages and its promise for the future.

We are approaching a situation, with many of our insect problems, where if we are to obtain permanent, satisfactory and economical control we must utilize chemical control along

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with the natural factors influencing populations. This will require sound ecological research into all the aspects of population dynamics of crop insects. Finally, a cooperative effort on the part of research groups, the extension service, and industry will be required to put compatible control programs into practice.★★

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BLASTING FERTILIZER

(From Page 33)

for themselves and should see that all other persons are in safe locations. Smoking must be prohibited at all times in the presence of explosives. The cap and explosives carrying boxes should be returned to the magazine before firing the blast.

There are two main types of blasting machines, generator and condenser. The condenser type is charged to capacity before time, either by a bank of dry cell batteries or through hand activated generators. The electrical discharge to the blasting circuit is provided through a suitable switching arrangement.

The generator type is activated by a quick twist or by firm downward thrust of a handle, depending on its construction or capacity.

If more than one hole is fired at a time and there is any doubt whatsoever that all shots have not been fired, no one should return within 30 minutes of applying the current

because of the possibility of a burning charge. After waiting the required time interval, the blaster should check the leg wires on the misfired cap with a galvanometer and, if the circuit is continuous, a re-blast could be attempted. If this fails, the stemming should be removed by washing it out with a strong jet of water. A new primer then should be placed in the hole and the shot re-blasted.

Following each blast, the pile should be examined to ensure that it is in safe condition before further drilling and blasting is undertaken. There is always the possibility of some segregation of the different sized particles in fertilizers and the resulting stratification often is the cause of a vertical-shaped pile's collapsing, a pile which appears quite safe. If possible, the piles should be blasted from the top and every effort should be made to prevent a vertical face.

The rules on handling explosives in blasting fertilizer are not too complicated. Compared to those on other jobs which explosives perform, they are basic.

The C-I-L pamphlet dealing with fertilizer blasting can be obtained at no cost by writing to the Agricultural Chemicals Division, Canadian Industries Ltd., Box 10, Montreal, Quebec.

PEST CONTROL IN INDIA

(From Page 39)

In India, the scope for biological control is limited because the majority of the crop pests are indigenous. Consequently there is an appreciable adjustment between the pest and the natural enemy. However, there are instances of indigenous natural enemies which are found to become quite important in certain places, under certain conditions.

There is a need for study of the actual percentage of parasitism under field conditions. To get better practical results, there is a need for fundamental research on the many phenomena of nutrition, respiration, host preference, searching capacity, multiple parasitism, hyper parasitism, super parasitism and economy of parasitism under Indian climatic and topographic conditions.★★

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FERTILIZER VIEWS

(From Page 62)

vanadium oxide. A catalyst of granular iron oxide makes possible the economic production of ammonia out of hydrogen and atmospheric nitrogen. Modern technology would be impossible were catalysts or enzymes suddenly to become unavailable.

The mysterious force which enables these chemical compounds to spark the surges of chemical activity in otherwise inert substances comes from the energy which resides in all matter. Numerous theories have been invented to explain the activity of enzymes or catalysts. Their effect is associated with surface or adsorption phenomena. They are too technical to describe in this brief attempt at explanation. Suffice it to say that in the future, agricultural research will inevitably be concerned to an increasing extent with enzymes and their influences in crops, soils and food processing.★★

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DROSOPHILA CONTROL

(From Page 69)

ethrins. It is believed that the dust should contain an acceptable stabilizing agent or anti-oxidant if it is to be reasonably stable. The dust may also lack stability if the proper carrier or dust diluent is not used and careful and specific formulating procedures with careful controls are not followed. To be reasonably stable the dust should retain 80% of the active pyrethrins after exposure in a paper bag to 100° F. for 30 days.

"Pyrethrum is a botanical material and the dust should be prepared in equipment used only for such formulations. No insecticide or chemical ingredient may be applied to tomatoes after harvest unless it is specifically acceptable to the Food and Drug Administration under the Miller Act. Pyrethrum-type formulations are the only materials permitted at this time.

"Tomato canners are urged to discuss the above pyrethrum dust requirements with the supplier and obtain adequate certification that the dust purchased meets these requirements, namely:

1. That the dust is an impregnated dust containing approximately 0.1% pyrethrins or equivalent.
2. That there is reasonable stability of active pyrethrins.
3. That the pyrethrum dusts are prepared in equipment used for that purpose only.
4. That F.D.A. requirements under the Miller Act will be met.

"If tomatoes arriving at the receiving and loading stations have not been treated in the field, they should be dusted as described above prior to loading on trucks for transport to the canning plant. Should it become unavoidable and tomatoes must be held at the receiving platform at the cannery more than 20 hours before processing, the fruit should be given an additional treatment of pyrethrum dust to supplement initial field or loading station treatment."

For control of *Drosophila* in canning plants, during periods when the plant is temporarily shut down, and before clean-up, the committee recommends use of pyrethrum space sprays. For control of *Drosophila* in areas where tomatoes are not present, the use of a residual insecticide is recommended, employing a toxicant such as diazinon, malathion, methoxychlor, DDT, aldrin or dieldrin on the outside walls of the canning plant, receiving platform, waste hoppers, receiving yards, receiving station platforms and underneath platforms at receiving and grading stations. It is also recommended that waste pits be sprayed regularly with one of the suggested residual type insecticides.

PRICES DROP

(From Page 67)

schedule. The new levels are \$110 a ton for deliveries, July 1 through September 30, and \$114 a ton for October 1 through December 31 delivery.

Earlier, both Spencer Chemical Co. and Monsanto had announced a \$2 a ton reduction in the price of ammonium nitrate fertilizer. While the base price was dropped \$2 a ton, from \$72 to \$70, there were increases in some of the seasonal price tags, cutting down somewhat previous concessions to buyers for acceptance of "off-season" delivery. The new \$70 base price on ammonium nitrate is due to go into effect January 1, 1959 and to apply on deliveries through June, 1959. During the "off-season" period between now and the first of the year the following prices apply, with the comparison noted with last year's quotations:

	1958 Per ton	1957 Per ton
August	\$65	64
September	66	64
October	67	68
November	68	68
December	69	68

The only item on which any advance has been reported recently is ammonium sulfate which has been in rather tight supply. Monsanto advanced quotations on granular sulfate \$1 a ton, the new price level being \$35 a ton in bulk and \$40 in bags.★★

EDITORIAL

(From Page 25)

to pesticide formulators, dealers and distributors.

In the successful introduction of a new product it is imperative that these professionals in the pesticide business first be educated as to what these new materials are,—and then continually prodded to put them into finished products and market them aggressively.

Some of the sales promotion medicine that fertilizer manufacturers are getting ready to take might be just what the insecticide industry needs too.★★

Summary of U.S.D.A. Fertilizer Consumption Report

(Year ended June 30, 1957)

THE final report on "Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States for the year ended June 30, 1957" has just been issued by the Fertilizer Investigations Research Branch, Soil and Water Conservation Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md. Authors are Walter Scholl, Marion M. Davis, Florence B. Crammatte, Esther I. Fox and Anna W. Woodard. Details of the preliminary report were published in "Agricultural Chemicals" issue of January, 1958. Copies of the full final report may be obtained by writing to the Fertilizer Investigations Research Branch at Beltsville.

The most significant figures from the report are presented in the following brief summary.

National Totals: Total of all fertilizer consumed, year ended June, '57, was 22,709,011 tons,—an increase of \$15,041 tons from previous year when total was 22,193,970 tons. '57 fertilizers contained 6,377,541 tons of primary nutrients, which was 322,061 tons (or 5.3%) greater than the '56 figure of 6,055,480 tons. In '57 all fertilizers contained 2,135,287 tons of N, 2,303,991 tons of available P_2O_5 , and 1,938,263 tons of K_2O , which was an increase of 10.4% for N, 2.5% for available P_2O_5 and 3.4% for K_2O . National weighted average of total nutrient content of all fertilizers in '57 was 29.3%, as compared with 28.29% for '56.

Regional Changes — Consumption was higher in '57 than in '56 for all but a few regions. Tonnage was up in most of the northern and western states, and most significant decline was in the southeast, continuing the declining trend of the previous year. Best gains were: Mountain States, up 19.4%; Pacific, up 8.9%; and West North Central, up 5.8%.

Mixtures—Total consumption of all mixtures in '57 was 14,702,807 tons, representing 64.7% of all fertilizers sold, as compared with 66.6% in '56. Drop in use of mixtures from '56 to '57 was 72,846 tons, continuing trend of previous year when there was a much larger decrease, 572,197 tons. There were 1,690 grades reported, but only 175 were consumed in

amounts as much as 4,000 tons or more. The top 15 grades represented 62.1% of the total tonnage. The 5-10-10 grade was consumed in largest tonnage. Next was grade 4-12-12, replacing the 3-12-12 grade which for previous six years had been the leading grade in tonnage. National weighted average of primary nutrients contained in '57 mixtures was: 5.74% N; 12.36% available P_2O_5 ; and 11.44% K_2O , for a total of 29.54%. This compares with '56 averages of 5.39% N; 12.08% P_2O_5 ; 11.20% K_2O ; and a 28.67% total.

Direct Application—Total consumption of materials for direct application in '57 was 8,006,204 tons, which was 587,887 tons (7.9%) more than the '56 total of 7,418,317 tons. Most significant changes were 13.2% gain in use of chemical nitrogen materials (433,576 tons higher), 13.8% increase in potash materials (56,060 tons) and 19.5% increase in secondary and trace nutrient materials (153,638 tons). However practically all of this big increase in secondary nutrients represented increased sale of gypsum by fertilizer manufacturers.

Of the individual materials the highest proportionate increase in use was the 125.8% gain registered by nitrogen solutions (up 136,983 tons from previous year). In the South Atlantic region which has been slow in adopting solutions, use increased from 27,158 tons in '56 to 75,941 tons in '57. Use of ammonium sulfate was up 101,785 tons (24.6%) in '57, while ammonium nitrate use gained 164,530 tons (17.5%). Consumption of ammonium nitrate was higher in all areas except Pacific region. Aqua ammonia up 71,484 tons (23.1%), the gain being principally in the Mountain and Pacific regions. Overall use of urea increased 16,543 tons (17.9%) but many areas showed decrease in urea use. Products to decline substantially in use for direct application this year included ammonium nitrate-limestone mixtures, calcium cyanamide, calcium nitrate and sodium nitrate.

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TALE ENDS

BASIC work in the investigation of the life processes of insects is progressing in the Pioneering Research Laboratory for Insect Physiology, one of nine basic research units recently established by the U.S.D.A. and operated by its Agricultural Research Service at Beltsville, Md. A group of entomologists there study how insects breathe, grow, digest, reproduce, etc.—and learn a lot about how they are affected by insecticides, moisture, heat, cold, etc. Some of the questions, highly important to the insecticide manufacturer and the pesticide applicator, to which these researchers are seeking the answers are: How do insecticides kill? How do insects

develop resistance to insecticides? How do changing natural conditions affect the ability of insecticides to control insect infestations?

AC

Our former "comrade allies" of a few years back, the modest Russians, have done it again. This time the remarkable discovery of one of their scientific wizards is a fungus fertilizer which, they claim, produces carrots three feet long, and cabbages five yards wide. Prof. Mikhail Shemyakin, whose studies are reported to have resulted in the discovery of this amazing new fer-

tilizer, claims that he grows these giant vegetables in half normal time.

AC

Our own domestic researchers now and again ring the bell themselves. A recent press release from the University of Minnesota tells of a newly developed and highly complex mechanical device for the study of soil fertility problems. The machine is currently being used to determine whether corn on one type soil responds to different forms of fertilizer treatment in the same way as it will on another soil. It applies anhydrous ammonia, nitrogen in liquid solutions, solid forms of nitrogen fertilizer, as well as different forms of complete starter fertilizer mixtures, in the corn row. It may be equipped with either corn planting units or grain drills. With the device, says Bob Anderson, assistant county agent for Kandiyohi County, "we can compare any rates of these different forms of fertilizer. These studies should eventually give us enough information, so that fertilizer recommendations can be 'tailor-made' for the soil on each farm in the country."

AC

A recent visitor to Ag Chem's office was Dr. Alvin J. Cox, who was until his retirement back in 1945 as chief of the Bureau of Chemistry, California State Department of Agriculture, perhaps the best known figure in the field of enforcement of insecticide laws and regulations. Since his retirement Dr. Cox has continued a consulting practice from his home at Palo Alto, Calif., and incidentally has also served as an active and hard working member of Agricultural Chemical's publication advisory board. His many friends around the industry will be happy to hear that he is still hale and hearty and as eager for work as in his earlier years. While visiting us he began to speculate on what effect it might have on a plant or shrub to grow it in a partial vacuum under a plastic shield of some type. Still that same inquiring mind at the age of 83.

AC

Recession Sign: Attendance may have been off a trifle at the recent NPFI convention, for we heard fewer complaints from those who in previous years had been unable to get room accommodations in the Greenbrier. But, on second thought, perhaps it was simply that the management has bulged out the walls, for there seemed to be the same thousands in attendance. The waiters and bellhops as usual disdained anything smaller than a dollar tip, the country ham was delicious, it was rather cool for the pool, the fairways were in great shape, the weather, at least the last two days, was perfect, and Herr Schultz presided as always at the horse shoe pitching. Proving that he is a man of diverse talents, he exhibited a surprising proficiency on the "beer bottle bass." Truly, one of the top meetings of the year, and one to which we always look forward.

AC

A new departure this year was an exhibit in a railroad car on the Greenbrier siding. On display was a new bag packer which attracted considerable attention and favorable comment. See full story elsewhere in this issue (Pg. 96)

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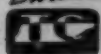
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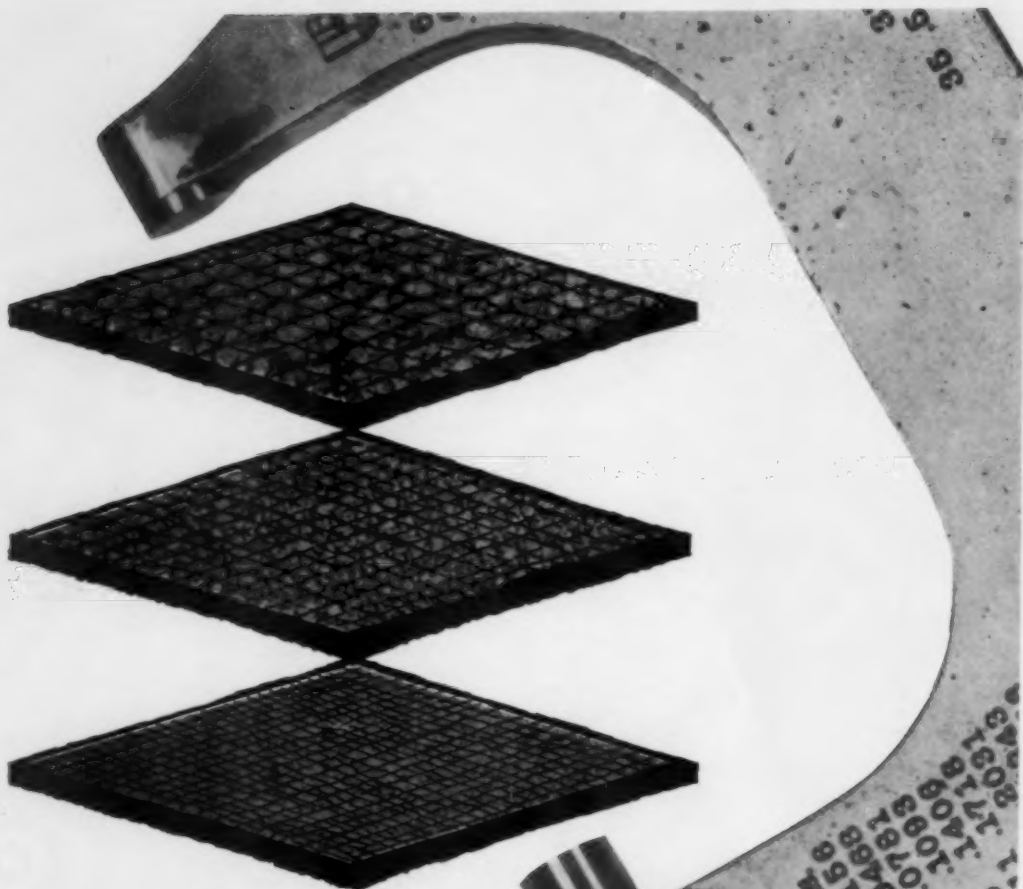
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